THE

JOURNAL OF GAS LIGHTING.

PUBLISHED MONTHLY.

No. 71, Vol. III.] LONDON, DECEMBER 11, 1854. [Price 1s., In America 30 Cents.

CONTENTS.

	PAGE
Circular to Gas Companies	585
Persecutions of Industry	587
Communicated Articles:—	
Is Torbane Mineral a Coal?	588
The Chemistry of Gas Lighting	591
On the Salubrity of the Use of Coal Gas	593
Correspondence:—	
Gas Tar as a Manure	594
The "Oil-of-Vitriol" Controversy	594
Our Patent System	595
Register of New Patents:—	
Lavender's Improvements for Stirring Matters in Retorts	595
Cundy's Improved Reflector for Artificial Light	595
Waite's Improvements in the Construction of Sewers	595
Hine's Method of Applying Glass, for Ornamenting Chandeliers	595
Crossland, Holiday, and Heaton's Improvements in Apparatus employed in the Manufacture of Pipes	595
Radigan and Grimouville's Improvements in Glasses and Shades used in Gas and other Lighting	596
Legal Intelligence:—	
Court of Queen's Bench.—Equitable Gas Company *v.* Jonassohn	596
Miscellaneous News:—	
City of London Commission of Sewers	597
Meeting of the Equitable Gas Company	598
Dr. Letheby's Eleventh Report of the Gas supplied in the City of London	600
Professor Crace Chenot on the Products Obtained from Coal	600
Ventilation of Sewers by Gas	601
A Scene on Newcastle Quay	601
The Ironfoundry Trade of Glasgow	601
Share List	602
Price Current	604

TO CORRESPONDENTS.

Wintoniensis *requests us to give publicity in our columns to the claims put forward by the long-tongued personage well-known amongst metropolitan gas inspectors by the cognomen of* "Pontifex Maximus," *in favour of a director of the Winchester Gas Company to the honours and emoluments of the office of Jack Pudding and editorial scavenger to the Coleman-street stags. The worthy, whoever he may be, evidently manipulates with the broom far more dexterously than with the pen; and, if he is wise, he will for the future stick to the former for a livelihood.*

Alumina.—*It would be ungenerous to pursue the matter further. The parties seem to be fully aware they have merited the castigation they have received, and to renew the subject without provocation would be to persecute a vanquished opponent.*

A Two Years' Subscriber.—*The articles which have appeared in this Journal under the title of "The Chemistry of Gas Lighting" and "Hughes' Treatise on Gas Works," published by Weale, may be advantageously studied by any one desirous of understanding the process of gas manufacture.*

J. W., Dudley.—*There is no general act of Parliament compelling gas companies to supply gas to any party willing to comply with all the company's rules. Compulsory clauses with this object have, however, been introduced into several local gas acts, at the suggestion of consumers who have presented petitions against the bills.*

W. B., Glasgow.—*Mr. L. Thompson is now on the Continent, and will be absent for some months. Letters addressed to him "Byker Bar, Newcastle-upon-Tyne," will be forwarded to him.*

NOTICES.

Subscribers who have not paid their subscriptions for 1854 are requested to remit 12s. for the entire year, or 6s. for the half-year, by Post-Office Order, payable to Thomas G. Barlow, at the Charing-cross Money Order Office.

The subscription is 10s. per annum if paid in advance, or 12s. on credit, payable in two sums of 6s. each, due in June and December of each year. All subscriptions commence from the 10th of January in each year.

Communications and orders for Advertisements to be addressed to the Editor, No. 3, Parliament-street, Westminster.

The offices of the Editor are removed from No. 32, Bucklersbury, to No. 3, Parliament-street, Westminster.

Circular to Gas Companies.

The gradual recovery now taking place from the extreme depression which property invested in gas works has been subjected to during the last few years, may be traced to two causes: first and foremost, to the demonstration of the fallacy of the calculations and statements put forward by Mr. Croll in 1849 and 1850; and next, to the confidence created in the sound and healthy position of the old established metropolitan companies, by the publicity recently given to their proceedings and accounts. It is true, the Great Central Company has, by adding about 3 per cent. yearly to its fixed capital, been able to keep up a fictitious dividend of 7½ or 8 per cent.; but it is certain that such a system cannot be permanently maintained: and we have also yet to ascertain the effect upon the contractors' finances of a rise of 40 or 50 per cent. in the price of coals, and in the other materials used in the production of gas. The coalowner, the fire-goods manufacturer, the ironfounder, and the engineer, all agree that no inconsiderable portion of the dividends of the metropolitan gas companies has for several years past come out of their pockets, and that the time is arrived when such a system must cease. Gas companies must, consequently, look forward to the payment of enhanced prices for the materials they consume, as those of 1852 and 1853 were notoriously unremunerative to the producers of such commodities. Time will show whether increased consumption of gas consequent upon its moderate price, and the high price of oil and tallow, will not compensate for this increase in its cost; in some districts it probably will, and in others it might be met by equitable arrangements amongst companies now in competition, similar to that which it is understood has been concluded between the Imperial and Western Companies, by which districts would be assigned to each, and great economy thereby introduced into the distribution expenditure; but any hasty attempt to seek for higher prices is, in our opinion, to be deprecated till further experience has been obtained of the effect of the present moderate price in increasing consumption.

The share lists and circulars of the various brokers are evidence of the feeling of the public with regard to the companies that have broken through deeply-rooted prejudices, and given publicity to their proceedings. Mr. Chas. D. Crosley, the eminent broker of Sun-court, Cornhill, gives notice in his December list that he has buyers for Equitable, Phœnix, and Chartered gas shares, and is a seller of Commercial and City shares—the former being companies copies of whose balance-sheets have appeared in our pages, and the latter excluding the press, unless the reporter be disguised as a shareholder—a sneaking practice to which we disdain to resort. It is to be hoped that when the beneficial effects which have attended the opening of the doors of general meetings to the press is appreciated by shareholders generally, the metropolitan gas companies which still meet with closed doors will no longer hesitate to follow the example set them by the Chartered, Equitable, Phœnix, London, and Great Central companies. As some guide to parties seeking investments for capital in gas works, we append a table of the capital and revenues of the six companies whose accounts are before the public, from which it will be seen how absurd has been the outcry against the oldest companies on the score of the heavy expenditure in their first experiments. The "Old Chartered," unlike some of its younger rivals, has no debenture debt; has the smallest capital in proportion to its rental, of any metropolitan gas company; and has upwards of £20,000 in the funds, as a reserve, to fall back upon, for extensions or improvements in its present works, or for the construction of new ones.

	Amount of Share and Debenture Capital. £	Annual Rental. £	Proportion of Capital to Rental.	Market Price of Shares.
Chartered	580,690	149,421	3·886	24 p. ct. disc.
Imperial*	930,000	213,653	4·352	90 p. ct. pm.
Great Central†	216,000	47,606	4·537	20 „ „
Phœnix	450,000	85,695	5·251	44 p. ct. disc.
Equitable	225,022	40,507	5·555	44 „ „
Western.....	162,890	28,473	5·720	30 „ „

The notices of intended applications to Parliament during the ensuing session for bills affecting gas interests, are neither so numerous or so important as those of several previous sessions, being principally confined to the raising of additional capital, and to the carrying out of agreements already entered into, and requiring the sanction of the Legislature. The following is a correct abstract of their titles and objects:—

ASHTON-UNDER-LYNE CORPORATION GAS WORKS AND WATER WORKS.—To enable the Ashton Gas Company to sell, and the Corporation to purchase, the works; to vest in the mayor, &c. all the powers, rights, and privileges of the Ashton Gas Company; and to empower the mayor, &c. to levy rates and charges for the supply of gas.

BIRMINGHAM GAS LIGHT AND COKE COMPANY.—To alter and amend the present act, and to enable the company to raise additional capital by means of shares, and by borrowing upon mortgage; also to enable the company to erect, enlarge, and extend their works.

BRECON CORPORATION AND LOCAL BOARD OF HEALTH.—To enable the corporation to make and supply gas for public and private use; and enable the corporation to purchase and to compel, if necessary, the proprietors to sell the existing gas-works.

CHESTERFIELD WATER WORKS AND GAS LIGHT COMPANY.—To enable the company to extend and maintain their works for the supply of water and gas, in and over the town and borough of Chesterfield, the parish of Brampton, and the townships of Newbold, Walton, Tapton, and Hasland, in the parish of Chesterfield; and to enable the company to raise an additional sum of money by shares, by loan, and on mortgage.

THE CITY OF LONDON GAS LIGHT AND COKE COMPANY.—To alter, amend, and enlarge, the provisions of the present act; and for power to increase their capital by the creation of shares.

GLOSSOP GAS COMPANY.—To alter, amend, and extend, the powers and provisions of the present act, and to enable the company to raise money by the creation of new shares.

HALIFAX GAS LIGHT AND COKE COMPANY.—To repeal the present act, and extend the limits of their supply to other neighbouring townships; also to raise further moneys by shares or stock, or by borrowing upon mortgage.

HARTLEPOOL GAS AND WATER COMPANY.—To amend the present act, with power to raise an additional capital by the creation of shares; also to borrow money on mortgage and bond.

HYDE ORIGINAL GAS WORKS.—To enable Isaac Booth, of Hyde, to continue to supply gas within the township of Hyde, or to incorporate a company for such purpose; and to transfer, or enable him to sell or transfer, his works to such company; and to empower the authorities to compel the said Isaac Booth or intended company to sell or transfer his or their works, and rights therein.

HYDE GAS COMPANY.—To incorporate a company, with power to purchase by compulsion or agreement, or take upon lease, all land, &c., necessary for their purposes.

LANCASTER WATERWORKS AND GAS ACT, 1852.—Amendment of act, with power to raise an additional sum of money, and to extend the time for the repayment of borrowed money.

LEEK IMPROVEMENT.—To enable the commissioners to continue the manufacture of gas for public and private use, and to make provision for the discharge of the mortgage debt upon the gas-works.

LONDON GAS LIGHT COMPANY.—To alter, amend, and enlarge, some of the powers and provisions of the "London Gas Light Act, 1852;" and to enable the company to raise money by the creation of new shares; also to convert into capital the arrears of dividends or interest now due, and to extinguish all claims to the said arrears by the allotment of new shares.

LUDLOW IMPROVEMENTS.—To transfer to the mayor and alderman, or commissioners appointed for the purpose, the powers of paving and lighting commissioners; and to enable the said authorities to supply and light with gas or otherwise, or to contract for the same, for public and private use; also to enable the company of proprietors of the Ludlow Gas Works to transfer, sell, or lease, the wkole or part of their works, with power to enable the said authorities to compel the said company to do the same.

NEWCASTLE-UNDER-LYME GAS.—To alter, amend, and enlarge, the provisions of the present act, and extend the limits of supply to the following places:—Newcastle-under-Lyme, Trentham, Stoke-upon-Trent, Keel, Wolstanton, Silverdale, Knutton or Knutton-heath, Chatterley, and Chesterton; also to increase the present capital, and to make certain alterations respecting the committee of management, &c.

NEWPORT (MON.) GAS COMPANY.—To amend and extend the present act, with power to increase the capital by the creation of new shares, and to borrow money on mortgages, or bonds or otherwise; also to purchase, compulsorily or by agreement, or to take on lease more ground for the purposes of their undertaking; to extend the limits of supply to the townships and parishes of Newport, St. Woollos parish, Christchurch parish, and Malpas parish; and to change the name of the company.

NEWTON-IN-MACKERFIELD (LANCASHIRE).—DISTRICT IMPROVEMENT.—To establish and incorporate a body of commissioners, with power to manufacture gas and to supply the same for public and private purposes, or to contract with any body of persons for the supply of gas.

OLDHAM CORPORATION.—GAS AND WATER SUPPLY.—To repeal and re-enact the existing acts, and enable the corporation to extend their supply.

OSSETT GAS COMPANY.—(Incorporation of company; supply of gas to the townships of Ossett-cum-Gawthorpe, in the parish of Dewsbury, and Hornbury, in the parish of Wakefield, in the West Riding of Yorkshire; amendment of other companies' acts.) To enable the company to purchase, compulsorily or otherwise, one or more closes of land; to erect and maintain upon some one or more of the said closes of ground, gas-works, with all necessary buildings, machinery, apparatus, &c.; to manufacture gas, and dispose of the coke, &c., and to supply gas for public and private purposes within the before-named parishes; to lay down mains, pipes, and other works necessary for such supply; and to levy rates, rents, and charges for such supply.

OVER-DARWEN GAS.—To alter and amend the present act, and extend the limits of supply to the whole of the townships of Over-Darwen and Eccleshill; also, to enable the company to increase their capital by the creation of new shares, and upon mortgage.

PHŒNIX GAS LIGHT AND COKE COMPANY.—To define the districts within which the South Metropolitan Gas Light and Coke Company, the London Gas Light Company, and the Surrey Consumers' Gas Company are empowered to sell gas; and for other purposes.

PLYMOUTH AND STONEHOUSE GAS.—To alter and amend the present act, and enable the company to extend their limits of supply to the neighbouring localities.

PUDSEY GAS.—To alter and amend present act, and enable the company to raise further capital by the creation of new shares or other means.

RATCLIFF GAS LIGHT AND COKE COMPANY.—To alter, amend, and enlarge the present act, and extend and define the limits of supply; also, to enable the company to raise money by borrowing upon mortgage.

ROTHERHAM GAS COMPANY.—To alter, amend, and enlarge some of the provisions of the present act; to enable the company to raise an additional sum of money by the creation of new shares, and also on loan; and to extend their present limits for the supply of gas; and to sell or lease their undertaking to the Local Board of Health.

SHEFFIELD UNITED GAS LIGHT COMPANY.—To alter, amend, and enlarge the present act, and extend their present works and limits of supply; also, to limit the mode of rating under the Sheffield Bridges and Streets Act, 1852.

SHREWSBURY IMPROVEMENT.—Power to purchase, by agreement or otherwise, the property of the Shrewsbury Gas Company, or to rent or lease the same.

STALYBRIDGE GAS.—To repeal the present act, and enable the company to raise additional capital by the creation of shares, and upon loan; also, to extend the limits of supply to the neighbouring townships.

STALYBRIDGE IMPROVEMENT, WATER WORKS, GAS WORKS, &c.—Power to enable the Town Commissioners to supply with gas, for public and private purposes, the town of Stalybridge; and to enable the commissioners to purchase, and to compel the Stalybridge Gas Company to sell, transfer, or lease, their works.

STOURBRIDGE GAS COMPANY.—To incorporate the company, and enable it to erect fresh works; also, to raise more money by the creation of new shares, and by borrowing upon mortgage.

SURREY CONSUMERS' GAS COMPANY'S ACT AMENDMENT, AND PURCHASE OF WORKS OF DEPTFORD GAS LIGHT AND COKE COMPANY.—To enable the Surrey Consumers' Gas Company to purchase, and the Deptford Gas Light and Coke Company to sell, the works of the latter company.

TAUNTON GAS.—To alter and amend the present act, and enable the company to increase their capital by new shares, or by loan upon mortgage, or other means.

WOOLWICH CONSUMERS' PROTECTIVE GAS COMPANY.—To incorporate the company, and change its name from that of the "Woolwich Consumers' Protective Gas Company," to that of the "Woolwich, Plumstead, and Charlton Consumers' Gas Company;" also, to enable the company to raise additional capital by shares and by mortgage.

WOOLWICH EQUITABLE GAS LIGHT AND COKE COMPANY.—To incorporate the company, with power to maintain, extend, and improve the gas manufactory, and to establish other manufactories and works; also, to make and supply gas for public and private purposes.

WESTON-SUPER-MARE GAS COMPANY.—To incorporate the company, and enable it to raise an additional sum of money by the creation of shares, and also on loan; as well as to pay a preferential dividend, and to extend their works.

The directors of the Imperial Gas Company have very discreetly changed their mode of proceeding against fraudulent consumers; and in cases where they are unable to obtain evidence sufficient to bring the commission of fraud home to the knowledge of the offender, they have treated the matter as one of debt, and have sued the party for the value of the gas consumed, giving the best evidence in their power as to the quantity not paid for. They have recently obtained two judgments in the County Courts against dishonest consumers, and in both cases the judge has awarded £50, the highest sum which can be sued for before him.

It is reported, that the treaty which has been for some time past under negotiation between the Municipality of Paris and the associated gas companies (the principal objects of which are to secure an immediate reduction in the price of gas, by a fusion of the several companies into one body), has been at length approved of by the various authorities whose sanction was required, and is now submitted for ratification to his Majesty the Emperor, who has, in consequence, nominated a commission, composed of four members of the *"Academie des Sciences,"* charged to examine into, and ascertain for the information of his Majesty, what is the cost price of gas. A similar commission had been some time since delegated by the Municipal Council to examine the books and accounts of the gas companies for a period of ten years; and we apprehend the second commission will ratify the conclusions of the first, confirmed as they are by the experience of this country.

* From the parliamentary evidence on the Imperial Gas Bill of last session.

† To the actual capital employed should be added the money borrowed, which does not appear as a separate item in the balance sheet.

PERSECUTIONS OF INDUSTRY.

It is a curious, though by no means an unimportant, fact, that, whilst in the present day there exists on the part of royalty an avowed disposition to sympathise with the middle classes, there should prevail amongst the "lords of the soil" —our "*soi-disant*" *high aristocracy*—a decided tendency to pander to fleeting and often illusory outcries of the lowest orders of the community. Things are, in one respect, very happily altered since the fatal era of Charles I.; and, so long as the highest personage in these realms reposes with confidence upon the real strength of the nation, we need care very little by what means a rapidly decaying nobility thinks proper to prop up its waning influence against the tidal power of industry, or display its ill-suppressed chagrin at the judicious predilections of its sovereign. Surely matters are worse with our "ancient houses" than even the public is aware of, or we should not so frequently find the "pure porcelain" of the land mingling itself up with, and relying for support upon, the lowest stratum of our social mud: yet, when an attack is to be made upon the interests of our manufacturing industry, who so ignorant as not to know that it will emanate from our *high aristocracy*, and be carried on in the name of "justice for the lower orders?" Is there a mob desirous of destroying all mechanical power which supersedes hand labour? it has its lordly advocate. Is there a wide-spread conspiracy or "strike" to overrule the natural law of "demand and supply?" it has its aristocratic exponent in a name perhaps coeval with William the Conqueror; and so, wherever that enterprising spirit which alone has raised Britain to her proud supremacy amongst nations—that spirit which threatens to extinguish mere conventional distinctions—wherever this onward spirit meets a barrier to its progress in the ignorance of those it supports, there will it find on the very summit of that obstacle the "mummied" representative of a name once, perhaps, honoured for the virtues of its owner, but now, perhaps, known only from the magnitude of his debts or vices.

Fortunate it is that we possess in the consort of our gracious Sovereign a Prince who knows how to discriminate betwixt real and imaginary honour, and who, by the choice of his companions, has shown that the qualities of a living man are of more importance in his eyes than the "bare-bone" merits of a dead ancestor. Of course, by such a choice he has drawn down upon himself a "cold shoulder" from the brainless bearers of many a gilded coronet; but he is well recompensed with the affections and kindly wishes of those who alone can secure to him and his an abiding position in the affairs of this country. To be the patron and friend of the manufacturing industry of Great Britain is, in a large sense, to be the ruler over civilised society—the living exponent of that which distinguishes the citizen from the savage—the philosopher from the brute.

First and foremost, on the other hand, and violently opposed to all this, stands one who has long been a hunter after vulgar notoriety—a votary at the shrine of what is called popular applause—a "friend of the lower orders." My Lord Palmerston is the man; and throughout a long life, remarkable chiefly for its political tergiversation, he has preserved this single trait of consistency—a persevering animosity to the progress of industrial development. Tory or Whig, Protectionist or Radical, Despot or Anarchist, his lordship has varied with the times, according to what seemed best suited to his purpose—

"Omnis color decuit Aristippum;"

but under no circumstances has he ever relinquished his invariable antipathy to the manufacturing interest, or failed to excite, as far as lay in his power, a sentiment of animosity on the part of the labourer towards all his real friends, the employers of labour.

Quite in keeping with such antecedents, we might therefore expect to find him, as he is, the concocter and mainspring of a most unconstitutional enactment for the suppression of nuisances—a measure, we hesitate not to say, too arbitrary and foreign to the course of free justice even for the innermost walls of the Kremlin. It is an act which sets at nought that grand palladium of British liberty—"the right of every man to be tried by his peers;" it is an act not more hostile to the freedom of our social existence than that which, two centuries ago, cost a monarch his crown and his head; and it is an act which, unless resisted manfully, may become a precedent for measures calculated to overthrow the most valuable of our political institutions. If a man may be fined £5 or unceremoniously imprisoned upon the "*ipse dixit*" of a *hired* witness, why may he not have his entire property confiscated, or himself sent to an eternal bastile, upon the same interested testimony? Most degrading to every liberal mind is the reflection that men are to be found, laying claim to the possession of scientific knowledge, who for a paltry fee will give evidence on either, or, if possible, upon both sides of any question: the reflection is degrading, but the practice is a fact, borne out, unhappily, by the every-day records of our judicial tribunals. My Lord Palmerston has had, therefore, no difficulty in getting everything of that kind which his detested enactment requires to set it in motion. He has found, of course, men fit for his work, as Macbeth found his, in the "mongrels" of the human species. We have nothing to say about the individuals chosen for this purpose: if they had refused, others would, no doubt, have been discovered willing to act; they are but the mechanical instruments of punishment, not the power which punishes. When a resolution has been formed to chastise a dog, "any stick will answer the purpose." Messrs. Taylor and Odling are my Lord Palmerston's bludgeons of to-day, and we heed them as little as we would a "Russian knout:" it is the hand and head that guide them which fix our attention.

Few of our readers can fail to have noticed in the *Times* and other papers the record of a series of *persecutions* for "nuisance-making" during the last month, which persecutions have been summarily dealt with under Lord Palmerston's late act for the suppression of what is popularly called "the smoke nuisance," in a manner no less startling than novel. To call the one-sided investigation gone through on these occasions a judicial inquiry, would be a mere mockery of the English language; the presumed delinquent is not brought up for trial, but for condemnation only. Worse than the infernal Rhadamanthus, who, we are told

"Castigatque auditque dolos"

(*punished* the defendant first, and *heard* him afterwards), our modern Lynch punishes upon the dictum of hired evidence; and, as to hearing, there is no such clause in the act. The only requirement is to prove that something has been done or left undone which constitutes what the scientific witness regards as a nuisance; and the magistrate has nothing more to do than to inflict punishment. Whether a nuisance really has or has not been committed, forms no part of the inquiry, nor is there any court of appeal where this can be tried. Under such circumstances we would ask, who is the judge—the scientific paid witness or the magistrate? We think the former.

Again, let us suppose a case, and imagine a talented and industrious man, who has gradually raised himself into affluence by following some honest but odoriferous business, which neither affects his own nor neighbour's health, as a twenty years' experience may have proved. He has, we say, got on in the world; and it is not stretching far the bounds of credibility to conceive that, on this very account alone, he has roused the implacable hate of all his poorer neighbours. Hitherto that hate has been powerless, and therefore they have kept it within the limits of a subdued spite; but now, thanks to my Lord Palmerston, they will "humble the upstart's pride: they cannot bear the stench; it affects all their healths. Jane has a cough—Mary Ann the dropsy—John the itch; and as to the others, why, they are so indescribably ill that they would rather wander the streets than live *there* rent free." Singularly enough, too, "it never was so bad until the passing of the new act." The favourite scientific "bludgeon" is called, who, of course, sees his way to a few fees—the offender is summoned—the magisterial farce enacted—the black mail levied and paid; and the amiable neighbours return home with their unprovoked hate and envy thoroughly appeased. Something, however, seems to arise out of such a state of things which may bring relief with it. My Lord Palmerston, though powerful, is not omnipotent—though windy as Boreas, he is not skilful as the admirable Crighton; in short, as Macbeth would say, he is "assailable." Now, there can be no lack of men in the House of Commons honest and courageous enough to ask this very "knowing individual" to enlighten the public with respect to the results he anticipates, and the objects he has in view—more especially his ultimate objects. We want a definition of the word "nuisance," for at present, in vulgar parlance, my Lord Palmerston is himself the greatest "manufacturers' nuisance" that we know of. Is an annoyance a nuisance? My neighbour's eldest boy, for instance, is learning to play the French horn. Is he, in Lord Palmerston's opinion, a nuisance? I know

what he is in mine; but may I indict him under the new act? Will any one ask Lord Palmerston what he means by the words, "any kind of manufacture or work by which a nuisance is created?"

Meanwhile, we think it is worthy the serious consideration of the manufacturing interest to establish an association for mutual help and support against this iniquitous act. Under a trifling change of names and offices, there is really no change in the system; and, no matter who may be the representatives by whom the part of "puppet" is discharged, the actual performers, the pullers of the wires, are precisely the same individuals as before the pretended alteration in the Board of Health. If any difference exists, it is not in favour of present arrangements. Ignominiously expelled from the Board of Health by the unanimous and just indignation of the country, the evil genius of the industrial interests of the empire has found an asylum in the new Metropolitan Commission of Sewers—its four members, nominated by the Home Office, being well-known and devoted partisans of all the crude absurdities and abortive schemes of Messrs. Chadwick and Co. Mr. F. O. Ward plays the part of dummy to his patron Mr. Robinson Crusoe Chadwick, whilst Dr. Waller Lewis enacts the part of Man Friday Southwood Smith, my Lord Palmerston pulling the wires, *vice* Lord Shaftesbury dismissed. The scene and the characters are changed, but the spirit and principles which seek to fetter and restrict the manufacturing industry of the country still remain as active, if not as obtrusive, as ever.

Communicated Articles.

IS TORBANE MINERAL A COAL?

By Andrew Fyfe, Esq., M.D., F.R.S.E., Professor of Chemistry, University and King's College, Aberdeen.*

The object I have in view in the following observations is to point out—first, the composition and properties of coal, and of the products of its distillation; and, secondly, from the information thus derived, to endeavour to ascertain whether the Torbane mineral is a coal.

In these remarks I shall confine myself almost entirely to the chemical properties.

The class of bitumens has been divided into two kinds—fluid and solid; the former consisting of petroleum, naphtha, and mineral tar—the latter of asphalt and coal. By far the most important of these is coal, of which there are different kinds, as brown coal, glance coal, and black coal. It is to the last of these that I am now to advert. Black coal has been divided into four classes—caking, cherry, splint, and cannel coal. These vary in appearance, but in their general properties they are very much the same. They all burn with more or less flame, and yield by their combustion carbonic acid and water. The first, owing to the quantity of fatty matter which it either contains or affords by its combustion, is agglutinated, and forms a cake on the surface, and hence its name; the latter burns with a bright flame and with a crackling noise, from which it is called parrot and cannel (candle) coal.

All of these coals, when subjected to heat, excluded from air, yield a large quantity of inflammable gas, tar, and ammoniacal liquor, besides a variety of other products, to be afterwards mentioned. The residue in the vessel is coke, which consists of carbon and earthy matter: the former called the fixed carbon, because it is not volatilized by the heat; the latter well known as the ash.

The specific gravity of coal varies from about 1180 to about 1330, water being 1000.

Analysis of Coal.—Two methods are practised in analysing coal:—1st. By application of heat to it contained in closed vessels, that is, heating it excluded from atmospheric air; by this means it is resolved into its fixed and volatile ingredients, or rather volatile products. 2nd. By subjecting it to heat in closed vessels along with substances that yield oxygen, such as oxide of copper or chromate of lead, which is by far the best. The first of these modes, in a commercial point of view, is the most important, because by means of it the proportion of gas that a coal will afford is ascertained, while, at the same time, we have an indication of the evaporative power, this being in general in proportion to the quantity of fixed carbon in the coke; hence, after heating the coal in closed vessels till it ceases to yield gaseous matter, the coke left is then burned in air to ascertain the amount of ash, the loss being that of carbon. The second mode of analysis, called the ultimate analysis, gives the proportion of the different ingredients. This is important, not so much in a commercial as in a scientific point of view; yet commercially it is also of importance, because, from the ascertained proportions of the component parts, we can, to a certain extent, determine the commercial value—such as its power of evolving heat by its combustion, and of affording gas by its carbonization. Both taken together indicate the value of a coal; at the same time, the indications thus given require to be tested by direct trial of the evaporative power of the coal and of its coke, and of the quantity and quality of the gas afforded.

I have made numerous trials by the first kind of analysis. The method followed was to place—say 100 grains from a variety of pieces of the coal—into a covered platinum crucible, and expose it to the heat of a gas furnace till it ceased to emit vapour or flame; the residue was then weighed, and reduced to powder while warm. One-tenth of the powder was then exposed on a platinum foil to heat and air till the whole of the carbon was burned off, after which the residue was weighed. Thus, if 100 grains heated in the crucible left 54 grains, loss = 46, and 5·4 of the coke burned left 1·1, loss = 4·3, then the composition is—

Volatile matter ..	46	=	Fixed carbon.. 43	79·6
Coke	54		Ash 11	20·4
	100		54	100·

Repeating the analysis in this way on different pieces, the average composition of the coal is ascertained. In conducting the analysis, due attention must be paid to the mode of applying the heat, and to the facility with which the gaseous products are allowed to escape; for it is well known that according as the temperature is very high or comparatively low, the quantity and quality of the volatile and gaseous matter vary. The results also depend much on the quick or gradual raising of the temperature, as will be afterwards shown.

In the following trials, the temperature was always quickly brought up to the full extent, and the volatile matter was allowed to escape rapidly. For the sake of brevity, I give the results in a tabular form:—

Table of the Proportions of Volatile Matter, of Coke, of Fixed Carbon, and of Ash, in 100 Parts of different Coals, and in the Torbane Mineral.

COALS. *c*, Cannel. *h*, Household.	Specific Gravity.	In 100 Parts of Coal.		COKE.		In 100 Parts of Coke.	
		Vol. Mr.	Coke.	Carbon.	Ash.	Carbon.	Ash.
Wigan Ince Hall .... *c.*	1255	37·6	62·4	5·6	6·4	89·7	10·3
Do. do... *c.*	..	37·7	62·3	50·5	11·8	81·	19·
Torbane .... *h.*	..	38·3	61·7	52·5	9·2	85·	15·
Kinneil..... *c.*	..	44·4	55·6	44·4	11·2	80·	20·
Donibristle .. *c.*	1237	46·5	53·5	49·2	4·3	92·	8·
Capeldrae(2d), *c.*	1310	47·2	52·8	24·3	28·5	46·	54·
Knightswood, *c.*	..	47·5	52·5	48·5	4·	92·4	7·6
Balbardie.... *h.*	..	43·6	56·4	29·8	26·6	52·8	47·2
Lochgellie .. *c.*	..	50·4	49·6	36·2	13·4	73·	27·
Disco Island, *h.*	1384	50·6	49·4	39·6	9·3	80·	20·
Monkland .. *c.*	..	54·2	45·8	39·5	6·3	86·2	13·8
Lesmahago .. *c.*	..	57·4	42·6	39·	3·6	91·5	8·5
Do. .... *c.*	..	58·3	41·7	35·3	6·4	84·6	15·4
Methill..... *c.*	..	59·	41·	18·5	22·5	45·	55·
Capeldrae(1st) *c.*	1238	59·1	40·9	33·2	7·7	18·8	81·2
Wemyss .... *c.*	..	66·6	33·4	21·9	11·5	65·5	34·5
Torbane .... *c.*	..	66·9	33·1	15·6	17·5	47·1	52·9
Do. ..... *c.*	..	68·1	31·9	14·5	17·4	45·4	54·6
Do. ..... *c.*	..	68·4	31·6	8·6	23·	27·2	72·8
Do. ..... *c.*	..	69·	31·	9·3	21·7	30·	70·
Do. ..... *c.*	..	69·8	30·2	13·1	17·1	43·3	56·7
Do. ..... *c.*	..	69·8	30·2	6·6	23·2	29·8	70·2
Do. ..... *c.*	..	70·1	29·1	16·3	12·8	56·	44·
Do., average	1199	68·8	31·2	11·9	18·3	38·4	61·6
Tree in Torbane	..	63·8	31·2	10·8	26·4	34·6	65·4

On inspecting this table, it will be seen that the proportion of volatile matter of the coals varies from about 37 to nearly 67 per cent.; of course the coke varies from about 33 to 63. The proportion of fixed carbon and of ash in the coke also varies, the former being from about 18 to 52—the ash from 3·6 to 28·5.

The average percentage of these ingredients in Torbane mineral is, 69 of volatile matter, 31 of coke, 12 of fixed carbon, and 18 of ash. It does not, therefore, differ from coals excepting in two particulars, viz., that it yields more gaseous products, and less fixed carbon; but even in these the difference is very trifling, being only about 2·4 per cent. more than that of the former from Wemyss' coal, and 8·5 less of the latter than from Methill coal—indeed some of the samples of Torbane contain only 2 per cent. less. The percentage of ash in some of the samples is less than in several of the coals, and the average quantity is not so great as that of Methill and Capeldræ.

I have already said, that it is necessary to conduct this mode of analysis in the same way in all the trials, because the results vary according to the mode of heating, and other circumstances. No doubt this will not affect the quantity of ash; but the quantity of coke, and, consequently, of fixed carbon, may be altered by the heat acting differently, and occasioning the gaseous elements to

* Read at the Meeting of the Royal Scottish Society of Arts, April 24, 1854.

unite with varying proportions of carbon. Hence we find that the products of analysis may be made to vary according to the modes of applying heat.

The following table shows the results of my trials, in which the heat was differently applied to coals and to Torbane mineral :—

Coals.	Slowly Heated.		Quickly Heated.	
	Vol. Mat.	Coke.	Vol. Mat.	Coke.
Newcastle caking	30·4	69·6	37·2	62·8
Buccleuch	50·5	49·5	55·0	45·0
Halbeith	46·0	54·0	49·0	51·0
Lesmahago	53·2	46·8	58·8	41·2
Capeldrae	38·4	61·6	49·2	50·8
Torbane	66·0	34·0	70·0	30·0

In all of the above the coke is greatest by the slow heating; in other words, as the quantity of ash is not affected, the fixed carbon is greatest. The same occurs with the Torbane mineral; accordingly, in this respect it resembles coal,

In connection with this part of the subject, I may state, that it is a remarkable circumstance, that in coals in which there is a difference in colour between the upper and under parts of the seam, there is a corresponding difference in the proportions of coke and volatile products. The part of the seam at the top always contains most volatile matter. Thus the following coals and Torbane mineral, heated exactly in the same way in all, yielded :—

Coals.	Upper Part.		Lower Part.	
	Vol. Mat.	Coke.	Vol. Mat.	Coke.
Capeldrae	51·2	48·8	46·6	53·4
Bathvale	57·2	42·8	51·0	49·0
Methill	70·5	29·5	37·7	62·3
Torbane (1)	65·1	34·9	63·3	36·7
Torbane (2)	72·7	27·3	56·3	43·7

Thus in coals the upper part of the seam contains most of the volatile products. The same occurs in Torbane mineral.

Ultimate Analysis.

I have had few opportunities of conducting the ultimate analysis of coals. I have therefore recourse, on this part of the subject, to the reports given in to the Lords Commissioners of the Admiralty; to which I shall add that of Capeldrae, and also that of the Torbane mineral conducted by myself.

These analyses were conducted in the usual way by heating the coals with the substance yielding oxygen, and ascertaining the quantity of carbon, oxygen, and hydrogen, by finding the weight of the carbonic acid and water produced. The nitrogen and sulphur were also determined by the usual processes of heating the coal with a mixture of potass and lime; and of acidifying the sulphur by means of nitric acid.

Table showing the average proportion of the different ingredients of coal and of Torbane mineral :—

Coals.	Carbon.	Hydrogen.	Oxygen.	Nitrogen	Sulphur.	Ash.
Scotch	80·72	6·1	8·45	1·32	1·25	2·16
Welsh	81·44	5·01	7·36	0·83	1·66	3·8
Newcastle	84·3	5·86	6·37	1·28	0·68	1·51
Derbyshire	79·65	4·96	10·17	1·48	1·07	2·69
Lancashire	76·53	4·95	11·52	1·22	1·21	4·51
Foreign	65·82	3·56	7·17	1·3	1·05	21·1
Capeldrae	56·77	6·79	8·79	1·9	0·35	25·4
Torbane	60·25	8·86	3·62	1·53	0·13	25·6

The above table shows that the quantity of all the ingredients varies considerably. That of the carbon is from about 56 to 84; of the hydrogen from 3·5 to 6·79; of the oxygen from 6·3 to 11·5; of the nitrogen from 0·8 to 1·9: the sulphur does not vary so much, the minimum being 0·35, the maximum nearly 2 per cent.

In the Torbane mineral the per centage of carbon is 60, which is above that in Capeldrae coal, and considerably below that in others. The hydrogen is beyond that of the coals. In them the highest quantity is nearly 6·8 per cent.; in Torbane it is 8·7—making a difference of only about 2 per cent. The oxygen in the different coals varies considerably. In some of the Welsh it has been found as high as 17, and as low as 1, per cent. In coals from other counties it also varies, ranging from 18 down to 1 per cent. Taking the average of all the results, as given above, it is about 9.

The oxygen in the Torbane mineral is 3·6, which is below that generally found in coals.

The proportion of sulphur in the coals analysed does not vary much. Some have really very little; it seldom amounts to 2 per cent. In the Torbane it is very small—indeed, with the exception of the Haswell Newcastle, it is less than in any of the coals.

With regard to the ashes of coal, they vary not only in quantity, but likewise in quality; they are not in greater quantity in Torbane mineral than in some of the coals. Sometimes the ashes are nearly colourless, at other times brownish, owing to the presence of oxide of iron. The ingredients are soluble alkaline and earthy sulphates and muriates; lime in small quantity; oxide of iron, alumina, and silica.

Water boiled on the ash obtained from coal, in general I have found to be alkaline. The ash, after being washed with boiling water, and then treated with muriatic acid at a natural temperature, gave a solution, which contained alumina. The residue, washed and boiled in muriatic acid, yielded alumina in solution. The residue, fused with potassa and then boiled in water, also afforded alumina, from which I infer that the silica and alumina are partly uncombined, partly as silicates.

When the powder of Methill coal is boiled in oil of vitriol diluted, the solution contains alumina; the residue, by being boiled in aqueous solution of potassa, also affords alumina.

With regard to the ash of Torbane mineral, it is in general nearly colourless, but not more so than that of Methill, Capeldrae, and Lochgelly. When treated with water, acids, and potassa, it acts exactly in the same way, and yields the same products that the ash of coal does. The entire coal also by these reagents is acted on, in every respect, in a similar way.

I have found the ash of the Torbane mineral to consist of—

Salts soluble in water	7
Oxide of iron	1
Alumina	41
Silica, with a trace of lime	51
	100

which is nearly the same as those found by others.

Products of the Distillation of Coal.

I have already alluded to the analysis of coal by which the per centage of coke and of volatile matter is ascertained. With regard to the latter, the products vary very much, not only in quantity but likewise in quality, according to the mode of applying the heat. When coal is quickly heated by being thrown into a retort previously brought to a full red heat, the products are gas, used for the purpose of illumination, tar, and ammoniacal liquor, varying in quantity according to the kind of coal employed. The ammoniacal liquor contains ammonia formed by the union of hydrogen with the nitrogen, and is in combination chiefly with sulphuretted hydrogen, derived also by the union of the sulphur and hydrogen of the coal. It is from it that almost all the ammoniacal salts now used in commerce are obtained. Thus, by the addition of muriatic acid, sulphuretted hydrogen is expelled, and muriate of ammonia is formed, which, by evaporation of the water and subsequent continuance of the heat, is sublimed and is thus freed from impurities; or, by the addition of oil of vitriol, sulphate of ammonia is produced, which, after evaporation, is mixed with muriate of soda and sublimed, by which sulphate of soda and muriate of ammonia are obtained—the latter being sublimed, the former remaining in the vessel in which the sublimation is conducted. By this last process the previous preparation of muriatic acid from sea salt, by means of oil of vitriol, is avoided. The tar, after being freed from the ammoniacal liquor, when subjected to distillation, yields naphtha, at first impure and of high specific gravity; but by redistillation becoming colourless and of the specific gravity of common naphtha, or benzole naphtha, as it is frequently called.

During the distillation of the tar, a considerable quantity of naphthaline is also volatilised and condensed in its solid form on the cool part of the apparatus. When the distillation of the tar is carried to a considerable extent, a quantity of an offensive smelling fluid is also brought off and condensed. This is called pitch oil, or grease oil. Other substances are obtained from the products of the first distillation of coal, but these are of less importance than the others. Pitch is left as the residue of the distillation.

Naphtha, obtained by the process described, is of specific gravity, about 776. It consists of $C_6 H_3$. It must not be considered as an ingredient of coal, but as a product of decomposition, formed by the union of the carbon and hydrogen existing in it. The same is the case with naphthaline. Its composition is $C_{10} H_4$, or a multiple of these proportions. Its specific gravity is about 870.

I have obtained all of these products by the carbonization of the Torbane mineral in the common process of manufacturing gas from it, for which purpose it is now extensively used along with common gas coals. Of course, as the proportion of nitrogen in the Torbane is small, the quantity of ammonia which it affords is also small, and is separated from the tar with considerable difficulty, unless water is added, by which the separation is easily effected. Removing the ammonia and subjecting the tar to distillation, I have procured naphtha of the usual specific gravity, and having all the properties of common naphtha; being acted on by reagents in the same way, and by the addition of nitrous acid yielding nitro-benzole $C_{12} H_5 O + NO_4$. When farther distilled it also afforded naphthaline and pitch oil—leaving pitch in the vessel: so that, in every respect, the fluid and solid products of distillation of Torbane mineral are the same as those from coal by the same process of decomposition.

With regard to the gaseous products, I have said that these vary in quantity and quality when obtained from different coals. Common household coal yields a gas of low illuminating power; cannel or parrot coals afford, in general, a larger quantity, while the gas is of superior illuminating power; hence their name of gas coals.

After the gaseous products have been thoroughly purified by passing them through water, lime, and other substances, the gas then consists of hydrogen, carbonic oxide, light hydro-carbon, and olefiant gas; or of a gas having the same relative proportions of carbon and hydrogen, and which is admitted to be the source of light when it is burned in contact with air.

Though I have, on former occasions, given to the Society the results of my trials on the quantity and quality of gas from different coals, yet, as these trials have of late years been greatly extended, and as many of them have been conducted in a different way from those formerly practised, I will now state my results in a tabular form, dividing the table into two parts: the first showing the illuminating power by the Bunsen Photometer, which was used in all the trials; the second showing the same as indicated by the amount of condensation by chlorine:—

Table of the Quantity of Coke, and of the Quantity and Quality of Gas from a Ton of different Coals, and from the Torbane Mineral, and of their Value in Pounds of Spermaceti, for yielding Light by the Combustion of their Gas, as proved by the Photometer.

Coals.	Lbs. of Coke	Cubic Feet of Gas.	Sp. Gr. of Gas.	Durab. in Min. and Secs.	Illumg. Power 1 Foot = Candles.	1 Foot = Grs. of Sperm.	Comp. Value of 1 Foot of Gas.	Value of Coal in lbs. of Sperm.	Comp. Value of Coals.
English caking	1680	9,746	555	50 40	3·1	372	1·03	531	1·0
Do. cannel (2)..	1397	12,010	574	48 55	3·0	360	1·0	617	1·36
Ramsay cannel	1512	9,746	631	60 40	3 3	396	1·1	555	1·47
Donibristle....	1220	9,923	593	51 0	7 5	900	2·5	1277	2·22
Lesmahago ...	952	10,176	652	70 0	8 7	1052	2·9	1530	2·86
Capeldrae (1)..	1000	11,500	644	65 25	8 31	997	2·77	1638	3·08
Capeldrae (2)..	1256	9,670	650	73 37	10·0	1200	3 33	1670	3·14
Torbane	760	15,486	726	84 44	10·3	1245	3·45	2755	5·18

In the construction of this table the durability was ascertained by finding the time required to burn a foot of gas, by using a jet with an aperture of $\frac{1}{33}$ of an inch, and a flame of 5 inches in length. The durability is, therefore, given in minutes and seconds. The candle referred to is a spermaceti, burning 120 grains per hour. In the last column the number of grains of sperm per foot, multiplied by the number of feet of gas per ton, gives the pounds of sperm; in other words, gives the value of the coal, taking quantity and quality of its gas into account.

In trying the illuminating power, the gas was consumed by an argand burner.

Table of the Quantity of Coke, and Quantity and Quality of Gas from a Ton of Coals, and from the Torbane Mineral, as shown by the Chlorine Process.

Coals.	Coke	Cubic Feet of Gas.	Specific Gravity of Gas.	Duraby. 1 Foot = Minutes & Secs.	Condensation by Chlorine	Comp. Value of 1 Foot of Gas.	Comp. Value of Coals.
Bemish caking..	1600	8,545	485	43 0	5·0	1·0	1·0
Leven splint ...	1120	8,060	492	43 0	5·3	1·06	1·01
Do. caking.....	1600	10,560	550	38 0	6·0	1·2	1·4
Adamson's do..	1620	12,456	646	38 0	6·3	1·2	1·75
North Lithins..	1280	9,021	555	53 0	10·8	2·1	2·2
Knightswood...	1164	9,184	557	48 0	9·0	1·8	2·3
Blackwood.....	1200	8,000	645	60 0	13·0	2·6	2·6
Kelvin-side	1150	9,007	640	65 0	14·0	2·8	2·9
Grange.....	1280	9,160	618	67 0	14·0	2·8	3·0
Lumphinnin ...	1200	8,953	622	66 0	14·5	2·9	3·0
Lithin's Glen...	1280	9,500	646	68 0	15·0	3·0	3·2
Marquis Lothian	1074	10,080	590	60 0	13·0	2·6	3·2
Lithin's Hill ...	1200	9,100	690	72 0	16·0	3·2	3·4
Kilbirnie.....	1200	10,290	624	67 0	15·0	3·0	3·6
Lochgelly.....	1200	9,054	637	57 30	14·0	2·8	3·7
Capeldrae (2)...	1256	9,670	650	73 37	17·8	3·56	4·09
Kinneil.....	1292	9,803	739	75 0	17·5	3·5	4·1
Lesmahago	1120	10,176	652	70 0	17·5	3·5	4·1
Monkland	1142	10,192	667	67 5	16·0	3·2	4·2
Methill.....	1198	7,706	683	66 0	15·5	3·1	4·3
Kirkness	1380	9,038	711	78 0	22·0	4·4	4·6
Capeldrae (1)...	999·9	11,500	644	65 25	18·0	3·6	4·8
Torbane.....	760	15,486	726	84 44	25·0	5·0	9·0

Of the above coals, all are cannels with the exception of the first four.

It will be observed that the comparative indications of the value of gases, when the condensation by chlorine is great, does not correspond with the value indicated by the photometer in the preceding table. This, in my opinion, is owing to our not having the means of burning gas so as to get the full amount of light from it.

Other Products of Distillation.

Another remarkable substance got from coal by distillation is paraffine and paraffine oil. Paraffine has been known for several years as a product of the distillation of wood; but it is only lately that it has been got from coal; and it is now manufactured on a large scale from it, and become an article of commercial importance. The process by which it and paraffine oil are procured, is patented by Mr. Young of Bathgate.

In this process the coal, broken into small pieces, is subjected, in iron retorts, to a low red heat; by which an inflammable gas (in fact, coal gas) is evolved, along with a vapour which condenses in the form of a dark-coloured fluid, having a very offensive odour. This is a mixture of ammoniacal liquor, paraffine oil, paraffine, and naphtha. The fluid thus collected is heated for some hours to a temperature of about 150°, by which the impurities fall to the bottom. The oil is then drawn off and distilled. The distilled product is next mixed with oil of vitriol, and well stirred; and, after remaining at rest for some hours, by which the vitriol and impurities subside, the upper part is drawn off, and mixed with a solution of carbonate of soda, or of caustic soda. The impurities, along with soda and any oil of vitriol which may be present, are then allowed to fall, and the supernatant fluid, by distillation, yields paraffine oil.

From the fluid thus procured, naphtha is obtained by distilling it along with steam passed into the boiler, by which the steam and naphtha come off; and, as they do not unite, they are easily separated by subsidence.

To obtain pure paraffine from the oil, it is cooled to about 30° or 40°, thrown on a filter, and allowed to drip till the fluid ceases to pass through. The residue on the filter is then mixed with a solution of carbonate of soda, stirred, and heated to about 140°. It is then allowed to remain at rest, by which the paraffine gradually collects on the surface. It is then to be removed, and the dark part on the lower side of the cake scraped off; after which the process is repeated, and the paraffine is in this way got nearly pure.

By squeezing it in a press, it may be freed entirely from colouring matter.

I have obtained this substance on a large scale from Lesmahago coal, and from the common household coal in the neighbourhood of Torbane—what is called household Boghead coal.

The paraffine from these, along with the naphtha, is the same in all—the latter yielding nitro-benzole on the addition of nitrous acid. I have obtained also the same products from the Torbane mineral, by conducting the process in the same way. Though it has been said that the naphtha from Torbane does not yield nitro-benzole, I never had any difficulty in obtaining it from it; indeed, it is more easily got from Torbane naphtha than from the naphtha of any coal I have tried. The naphtha got in this process, like that from coal in the manufacture of gas, also varies very much in specific gravity, according to its distillation: I have found it to be from 870° to 776°.

I have now to allude to other substances to which the Torbane mineral has been assimilated. The first of these is asphaltum; but from this it is easily distinguished.

Different kinds of coal are acted on differently by naphtha, the quantity of soluble matter in all of them being very small.

The following are the results of my trials:—

Coals.	Per Cent. of Matter Soluble in Naphtha.
Newcastle caking	4·2 5·8 9·8
A cannel coal (1)	2·
Do. (2)	3·
Do. (3)	4·
Halbeith do.	1·5
Capeldrae do.	0·
Torbane (*black*)	1·2
Do. (*brown*)	1·4

From the above it is evident, not only that Torbane is not an asphalt, but that it resembles common coals in its action with naphtha.

Again, it differs from asphalt in its action with heat.

The following are the results of my trials:—

	Asphalt.	Torbane.
By the heat of tin, just melted	Melted, not inflamed	Not affected.
Do. lead, do.	Do. do.	Do.
Do. iron red hot	Do. do.	Do. [ed.
Do. do. at full red heat	Do. and inflamed	Inflamed, not melt-

Again, the specific gravity of Torbane is about 1180; that of asphalt is about 1090.

Another remarkable difference between Torbane and asphalt is the electric condition. Asphalt is an electric; Torbane is decidedly non-electric: in this respect differing from asphalt, and resembling coal, which is non-electric.

I may here remark, that the term bituminous, as applied to coal, is improperly used. We speak of highly bituminous coals; by which is meant those that burn with a great deal of flame, and yield a large quantity of smoke. Now, those that do so are the *least* bituminous. The above table shows that the English caking coal, which is a bad gas coal, is more bituminous than others; and so far is Torbane mineral from being bituminous, that it does not yield more than about 1½ per cent. of bitumen to naphtha.

In the experiments above referred to, the coals and the Torbane

mineral were boiled for twenty-four hours in naphtha, under the usual pressure, recourse having been had to means for preventing the evaporation and loss of naphtha.

Another class of substances to which the Torbane mineral has been supposed to belong, is shales, especially those belonging to the coal formation.

From the large per centage of earthy matter in Torbane, it has by some been considered to be a kind of shale—a bituminous shale, or *bitumenite;* but we shall find that it is easily distinguished from them. I have analysed a great many shales, and now give the results of the analyses, taking the extremes along with several of those intermediate in their composition:—

Table of the Composition of Shales.

Shales.	Volatile Matter.	Non-Volatile Matter.	Non-Volatile Matter.	
			Fixed Carbon.	Ash.
Above Dysart iron stone..	19·	81·	7·	74·
Under Craig coal.....	7·8	92·2	6·	86·2
Roof of do.	7·7	92·3	0·	92·3
Do. of wood coal.....	7·	93·	8·	85·
West Wemyss	13·5	86·5	2·5	84·
Lancashire (1)	15·9	84·1	7·7	76·4
Do. (2)	13·14	86·86	7·9	78·96
Do. (3)	7·7	92·3	8·8	3·5
Average.....	11·46	88·53	5·98	82·54
Torbane.....	69·	31·	12·	19·

It will be seen, on inspection of the above table, that there is a great difference between shales and Torbane mineral. With two exceptions, I have never found a shale to have more than 20 per cent. of inflammable matter. In the first of those in the above table, the whole inflammable matter, after deducting the moisture in the volatile products, amounted to 20·56. In the Lancashire shales, Nos. 1 and 2, the moisture carried off with the volatile products amounted in the former to 2·1, and in the latter to 2·4; and, deducting these, there are of inflammable ingredients 21·4 in the former, and 18·6 in the latter. Thus, taking the extreme as about 20 per cent. of inflammables, leaves 80 of ash. We here observe a wide distinction between the Torbane mineral and shales, the latter having, on an average, about 17 or 18 of inflammable matter, and from 82 to 83 of earthy matter; while the former has the proportions reversed.

These remarks apply solely to shales of the coal formation, such as as occur in the stratified beds. Shales of this kind do not yield bitumen to naphtha; in this respect they resemble coal: in fact, they contain little, if any, bitumen. There are, however, other shales, such as those that contain bitumen, and yield it to naphtha—strictly speaking, bituminous shales. From these the Torbane mineral differs, in giving very little bitumen to naphtha, the quantity not exceeding 1·5 per cent.

It has been said that Torbane mineral, when breathed on, emits an earthy or *clayey* odour, and that, therefore, it in this respect resembles a shale. This, however, is not peculiar to Torbane mineral. I have in my possession pieces of Capeldrae and Methill coal which emit a similar odour.

There is still another substance to which I have to advert, and to which the Torbane is closely allied; I mean what is called coal rhombs; in other words, an impure coal not worth working.

The composition two of these I found to be:—

	Volatile Matter.	Coke.	Coke.	
			Carbon.	Ash.
Wemyss	33·3	66·7	23·	43·7
Methill	37·4	62·6	30·	32·6

In these the earthy matter predominates, the quantity of volatile products being small. It is remarkable also that, though rhombs occur at the upper part of the seam of coal, yet they differ in composition from coal itself, in containing a large quantity of earthy matter. I have already said that in coals varying in colour in different parts of the same seam, the upper part has always the greatest amount of volatile matter; thus also pointing out a remarkable difference between rhombs and the Torbane mineral.

I have thus shown that the Torbane mineral, in a chemical point of view, resembles coal. It has in it all the component parts of coal, and in nearly the same proportions as in some of them. It does not contain anything that is not found in coals. It yields the same products by distillation, at different temperatures, such as gas for illumination, tar, and ammonial liquor, benzole, naphtha, naphthaline, pitch oil, paraffine oil, and paraffine. I have shown also that it differs materially from asphalt, and from shales, and bituminous shales, in containing almost no bitumen. I feel, therefore, warranted in maintaining the opinion I have all along held, and in still continuing to consider it what, in 1850, I reported it to be, when I first subjected it to trial—that *it is a coal*, and *one of a very superior quality, for the manufacture of coal gas.*

THE CHEMISTRY OF GAS LIGHTING.

(*Concluded from p.* 379.)

By way of conclusion to our remarks upon the chemistry of gas lighting, it now becomes necessary to present, in a kind of condensed *resumé* or diagrammatic form, the various chemical changes which ensue during the operations connected with the manufacture and combustion of coal gas. Thus we shall be enabled to construct a sort of index, suited to recal to the minds of our readers many of those facts which at present are so intermingled with the general argument of the subject as to put on a disconnected or isolated appearance, detracting somewhat from their proper utility.

Although originally derived from the vegetable kingdom of a past era, the composition of coal is nevertheless found to resemble precisely that which prevails amongst the great bulk of the vegetables (whether trees or plants) of the present day; and, indeed, if we compare together the constituents of coal with those of the existing representatives of the plants or families of plants which originated the coal formation, we shall be more than ever struck with the identity of their composition. The plants of the coal formation no doubt contained, as their present representatives do, the elements of lignin conjoined to those of vegetable albumen and gelatine, or what is called gluten; with which, of course, were associated the usual inorganic or alkaline, earthy, and metallic substances still found under the name ash, or incombustible residue, of plants. In the lignin we have carbon, oxygen, and hydrogen; in the albumen and gelatine we find superadded to these, nitrogen, sulphur, and phosphate of lime, with a little chloride of sodium; and in the ash we discover silica, lime, alumina, iron, and manganese, which therefore ought to represent, and, in fact, really do represent, the average components of coal. No arsenic has ever yet been discovered in coal, nor in any plant, though a trace of copper is by no means unfrequent in the coal formation; and it is known that wheat grown in soils containing oxide of copper becomes slightly impregnated with that metal. We may hence conclude that arsenic is either poisonous to plants or incapable of entering into their assimilating organs—a provision singularly illustrative of that divine foresight which rendered man dependent upon artificial heat for the full development of his mission in this world. Did coal and wood contain a volatile and poisonous substance like arsenic, their use as fuel would be totally interdicted; and it is well worthy of observation that all the iron pyrites hitherto known to geologists are largely impregnated with this fatal mineral, except only the iron pyrites found in coal.

Casting a glance at the composition of coal, we see at once the origin of the various products obtained by its distillation at a bright red heat. Thus we are able, in a tabulated form, to observe the original and subsequent order of arrangement which takes place on disturbing the normal position. Omitting unnecessary ingredients, or those which remain unaffected at a red heat, we have—

Coal composed of { Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Iron, } which yield { Coke, Carburretted hydrogen, Hydrogen, Various naphthas, Carbonic oxide, „ acid, Sulphuretted hydrogen, Ammonia, Hydrocyanic acid, Sulphocyanic acid, Bisulphuret of carbon, Various basic hydrocarbons containing nitrogen, Protosulphuret of iron, Tar, Water. }

Here it will be seen that the excess of carbon remains as coke, and this holds the protosulphuret of iron derived from the decomposition of the bisulphuret contained in the coal; the hydrogen in part remains free, whilst part of it combines with carbon, giving rise to various kinds of hydrocarbon, such as gas, naphtha, and tar, or uniting also to a little nitrogen, produces basic compounds and hydrocyanic acid; another portion of the hydrogen combines with half of the sulphur of the bisulphuret of iron, and with any free sulphur present in the coal, to form sulphuretted hydrogen; and the remainder unites to oxygen to form water, or to nitrogen to produce ammonia—the rest of the oxygen being taken up by part of the carbon; and thus carbonic oxide and carbonic acid are generated. The production of the bisulphuret of carbon is altogether a secondary action, and depends upon the circumstance that iron has a stronger affinity for carbon than for sulphur—a fact which enables us to distil sulphur in cast-iron vessels, though this cannot be safely done in those of wrought iron. When a mixture of protosulphuret of iron and carbon is exposed to a high temperature, decomposition ensues, and carburet of iron and bisulphuret of carbon are the results—that is to say, the metallic iron and the sulphur both combine with the carbon, the former to constitute an exceedingly fixed, and the latter an extremely volatile, compound; thus the two substances, before united, are separated from each other, and new combinations formed. Now, gas-coke is exactly such a mixture of protosulphuret of iron and carbon as

is here alluded to; consequently when the heat, after expelling the volatile constituents of the coal, is still made to act upon the residuary coke, bisulphuret of carbon makes its appearance. Its production therefore has reference to the temperature employed and to the weight of the charge, as this implies a longer period of subjection to the action of the fire; so that in practice it is found that the gas from the last portions of a charge is more contaminated with this impurity than from the first.

Consistently with this view is the practice of coke-making, where the charge of coke is kept for 96 or even 120 hours exposed to a very high heat, so as to expel, in the shape of bisulphuret of carbon, the whole of the sulphur, and reduce the iron to the harmless condition of carburet of iron, when, of course, being similar in composition to the bars of the furnace in which the coke is burnt, it manifests no injurious action upon them.

Passing from the retort to the hydraulic main and condenser, we here find the several products before enumerated separating according to the degree of their condensibility by cold. The tar and the water condense and carry down with them a portion of the other constituents. The tar is found to consist of or to contain various hydrocarbons, mixed with soot, or finely divided carbon, which soot is thus prevented from reaching the purifier; the water combines with much of the carbonate and hydrosulphate of ammonia, and also with part of the hydrocyanic and sulphocyanic acids, constituting what is known under the name "ammoniacal liquor;" which, moreover, usually contains some muriate of ammonia, derived, as is supposed, from the decomposition of the chloride of sodium of the coal. The modes of treating these products have been before decribed, and need not, therefore, detain us here; but it is certain that too little attention has hitherto been given to them by practical men. They will amply repay the labour of working them.

From the condenser we go onward to the purifier, and here a diversity of practice prevails, according to the exigencies of the case. Those who have not been beset by the prevailing sanitary nuisance-mongers rely upon lime and water alone as an effectual means of purification; and with great reason they do so, seeing that in a practical sense these are the only substances required to ensure complete purification. The gas from the condenser contains carbonate and hydrosulphate of ammonia, with free carbonic acid and sulphuretted hydrogen. When passed through a coke scrubber well supplied with water, the ammoniacal compounds are sufficiently removed, whether this be done before or after the use of lime, though of course it is better that the scrubber should precede the lime purifier. After passing the scrubber, the remaining impurities are carbonic acid and sulphuretted hydrogen, in the average ratio of nearly 1 per cent. of sulphuretted hydrogen, and 2½ of carbonic acid.

On reaching the lime in the purifier, these give rise to carbonate of lime and hydrosulphate of lime; and there is this remarkable fact connected with the power of lime to purify gas in this way, which also applies to the case of oxide of iron, viz., that if all the ammonia has been removed from the foul gas before it reaches the purifier, the amount of gas capable of being purified by a given amount of lime is much lessened.

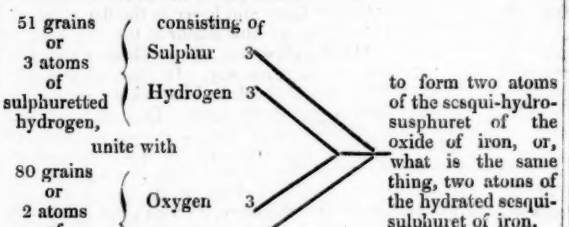
Admitting, for the sake of argument, that 200 measures of foul gas contain 2 of sulphuretted hydrogen and 5 of carbonic acid, or that the atoms of carbonic acid and of sulphuretted hydrogen are to each other as 5 to 2, then, since 5 atoms of carbonic acid weigh 110 grains, and 2 atoms of sulphuretted hydrogen weigh 34 grains, we have the following diagram to represent the amount of pure lime required in purification:—

110 grains or 5 atoms of carbonic acid	will saturate	140 grains or 5 atoms of pure lime,

and

34 grains or 2 atoms of sulphuretted hydrogen	will saturate	56 grains or 2 atoms of pure lime;

consequently, for every 144 grains of these mixed impurities, 196 grains of pure lime will be required. If, now, we assume that every cubic foot of such a mixture of carbonic acid and sulphuretted hydrogen weighs 750 grains, then the total impurity from a ton of coals would, at the rate of 3½ per cent. in volume, weigh about 34 lb., and, consequently, require about 46 lb. of pure lime for its removal. In practice, this is usually done with a bushel, or about 56 lb., of common lime; which, all things considered, is by no means unsatisfactory. One of the advantages of lime purification arises from the fact that, when the lime approaches saturation, it evolves sulphuretted hydrogen, and not carbonic acid; a simple lead-test is therefore a sufficient indication of purity; but with oxide of iron this is not the case, and therefore much more attention on the part of the superintendent of the works becomes necessary: and not only so, but the whole process is materially changed, for with oxide of iron a double set of purifiers must be had recourse to. The impurity removed from foul gas by oxide of iron is sulphuretted hydrogen alone, which, as we have seen, forms only $\frac{3}{7}$ths at most of the total quantity: to remove the remaining carbonic acid, lime is needed, and that, too, in almost as large a quantity as if no oxide of iron had been employed—a peculiarity caused, as we have before intimated, by the absence of ammonia in the gas after passing the oxide-of-iron purifier. The oxide of iron usually employed for purifying is the sesquioxide, either hydrated or anhydrous, but in both cases possessing a chemical power derived from some condition not yet well understood, but analogous to that of spongy platinum, cobalt, nickel, and some other substances. The first effect of sulphuretted hydrogen upon the sesquioxide of iron has been regarded as a simple process of deoxidation, by which water was formed, sulphur deposited, and protoxide of iron produced. But this is probably incorrect, and at all events it is quite as consistent with known facts to assume that a sesqui-hydro-sulphuret of the oxide of iron is produced; upon which supposition the nature of the action would be as follows:—

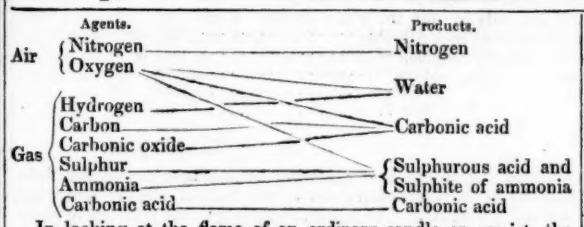

51 grains or 3 atoms of sulphuretted hydrogen,
consisting of
Sulphur 3
Hydrogen 3
unite with
80 grains or 2 atoms of sesquioxide of iron
Oxygen 3
Iron 2
to form two atoms of the sesqui-hydro-susphuret of the oxide of iron, or, what is the same thing, two atoms of the hydrated sesqui-sulphuret of iron.

There is, however, something unexplained, as yet, in the comparative weakness of the oxide of iron for purifying gas: thus, upon the conditions of the above diagram, not more than 16 lb. of oxide of iron should be required to remove the whole of the sulphuretted hydrogen produced from a ton of coals; but it usually takes about four times that quantity to produce the desired effect.

On exposing the sesqui-hydro-sulphuret of the oxide of iron to the air, it would appear as if the oxide of iron acted catalytically upon the sulphuretted hydrogen present with it, and caused the hydrogen to quit the sulphur, and unite to the oxygen of the air, thus forming water and liberating sulphur; the ultimate effect being sesqui-oxide of iron, sulphur, and water, with a little sulphate of iron, caused by an action similar to that which induces the solution of platinum in nitric acid when alloyed with silver. In support of this view, we may adduce the fact, that when sulphurretted hydrogen is made to act upon sesquioxide of iron with atmospheric contact, it takes fire precisely as hydrogen does when directed upon spongy platinum under the same circumstances. At all events, the oxide of iron may be used over and over again, until the amount of sulphur in it becomes so great as by fusing during the "revification," as it is called; and thus sealing up the particles of metallic oxide, so as to prevent them from acting on the foul gas, when, of course, fresh oxide is required. The use of lime, subsequently to that of the oxide of iron, is quite indispensable, and ought never to be omitted. A kind of ferruginous peat, containing subphosphate of iron, has lately been introduced, under a patent, which promises to supersede most other forms of iron purification.

But little need be said respecting the products which arise during the combustion of gas: these, though varying slightly from atmospheric changes, consist essentially of water and carbonic acid, with a small quantity of sulphate and formiate of ammonia, sulphurous acid, aldehyde, and a peculiar compound possessing basic properties, and having, in the free state, an intense odour of soot, but which entirely disappears by saturation with an acid. It might appear singular to one unacquainted with the notorious anti-combustive power of carbonic acid, that any compound capable of being consumed should escape from the flame of a gas burner unburnt; but, when the beautiful experiments of Sir H. Davy are remembered, and it is also taken into consideration that the upper part of every carboniferous flame is necessarily surrounded by carbonic acid, nitrogen, and the vapour of water—three of the most powerful extinguishers—it is only natural that a portion of the central constituents of the flame should escape unconsumed, whether generated from gas, wax, tallow, or oil. The same circumstance which interdicts perfect combustion to a hydro-carbon, would, of course, prevent it with such a substance as sulphur; and therefore it is found that free sulphurous acid only, and not free sulphuric, is generated from a gas flame, even though this flame be produced by unpurified gas, or gas purposely charged with sulphuretted hydrogen or bisulphuret of carbon.

By way of illustrating the nature of the process which ensues during the combustion of coal gas in atmospheric air, we may assume the following diagram as sufficiently near the actual composition of the agents employed and the results obtained:—



In looking at the flame of an ordinary candle or gas-jet, the effect of the carbonic acid generated may be seen by noticing the gradual change in the hue of the flame from the bottom to the top. At the lower part there is nothing to impede combustion, and a pale blue light is the consequence: higher up this becomes of a greenish white; then white, yellow, yellowish red, and finally brown or brownish black, with an inclination to smoke at the apex.

Lastly, if we arrange a spermaceti candle so that it may be supplied with air contaminated with various per centages of carbonic acid, we shall perceive that these changes in colour come down, as the carbonic acid is increased, lower and lower in the flame, which soon begins to smoke; and, ere the blue colour at the very bottom has begun to put in a reddish yellow hue, the candle goes out, and the wick does not glow in the usual way. In pure oxygen, the blue part enlarges, and the rest of the flame becomes almost entirely of a dazzling white, except quite at the apex. Thus, it is evident that, in the ordinary combustion of gas, a minute quantity of matter must always escape combustion; and this will be the greater the richer the gas; for Sir H. Davy found that, of all gases, carburetted hydrogen was the least accendible, or, in other words, the easiest to be extinguished. As, therefore, the rich gases give, bulk for bulk, more carbonic acid than the poor ones, there will be a relatively larger production of unburnt residue; but, taken in the sense of equal lights, the conclusion would, no doubt, be in the opposite direction.

ON THE SALUBRITY OF THE USE OF COAL GAS.

REPORT TO THE DIRECTORS OF THE CHARTERED GAS COMPANY, BY DR. LEESON, F.R.S., AND R. WARINGTON, ESQ., *Vice-President of the Chemical Society.**

In compliance with your instructions, requesting from us our opinion of Dr. Letheby's statements laid before the Commissioners of Sewers of the City of London, more especially as regarded the production of oil of vitriol from coal gas; we regret having so long delayed our report, but trust you will consider us right in having waited for the further statement which has been now presented, in compliance with the instructions of the said Commissioners, inasmuch as it allowed Dr. Letheby an opportunity for the correction of certain inaccuracies and exaggerated expressions which, however hasty or unintentional, were certainly calculated greatly to mislead and alarm the public, however manifest it might be to the few scientifically acquainted with the subject, that so large a quantity of "oil of vitriol," or "vitriolic acid," could not possibly result from the *ordinary* combustion of coal gas.

Without for one moment doubting the intentional accuracy of Dr. Letheby's statements, we cannot but feel that, in a case involving the character and integrity of the gas companies, the detail of the experiments actually made ought to have been appended to the report, with every information as to the dates, the *modus operandi*, &c.; we should then have been enabled to judge how far the experiments themselves were entitled to confidence, and what objections might be reasonably entertained with reference to the conclusions which have been based upon them. Every scientific observer knows how easily this might have been done, and will be but little inclined to rely on the mere deductions of an experimenter, when the grounds of confidence are thus withheld.

We will now state what appears to have been objectionable in reference to the statements themselves, and the sanitary deductions framed upon them.

We believe that the "oil of vitriol" has been, as already stated, *manufactured* from the gas; not produced by the ordinary method of combustion, but by a peculiar process adopted for these experiments; and we have reason to doubt, in the absence of any specific evidence to the contrary, whether all the acid produced was actually sulphuric acid.

To show the actual contamination of the air of an apartment in which gas is burnt, the air itself ought to be analysed, and we should then probably find that any sulphuric acid generated by the ordinary combustion of the gas has been neutralised by the ammonia frequently contained in it, by the lime or carbonate of lime present in the whitewash or plaster of the ceilings and walls of an apartment, as well as by other combinations. The absence of any such experiments removes from a reflecting mind confidence in these deductions; and then supposing, which is difficult, that free sulphuric acid† (oil of vitriol), which requires a temperature approaching a red heat (620° of Fahrenheit), or rather above the melting point of lead, to sustain it in the vaporous condition, could exist in the atmosphere of an apartment. If its per centage in the air had been shown by experiment, the public would probably have smiled at its infinitesimal proportion, instead of being alarmed at the fearful amount of 15 grains of *oil of vitriol* from every 100 cubic feet of gas, which, in a medical journal of most extensive circulation, has been amusingly increased one thousand seven hundred and twenty-eight times by stating inches instead of feet.

Again, we are told that these conclusions are borne out by experiments made at the Athenæum and elsewhere years ago, by chemists whose accuracy and talent we would not for a moment question; but it must be remembered that these experiments were made at a period when the methods of purifying gas were far less efficient than those at present employed, and the results simply show, what can be well-imagined, that the atmosphere of rooms, constructed without any ventilation, like an inverted bell-glass, to receive and contain not only the various products from the combustion of either candles or numerous gas-burners, but also the exhalations, dust, and heat of a crowded apartment, was certain to prove injurious to a material like the leather used for binding books, which, from its peculiar constitution, is very subject to decay, and when exposed to a heated and vitiated air soon becomes friable and rotten; this decay has been observed in many old libraries long before the use of gas was known.

2ndly. As to the amount of sulphur actually existing in combination with the gas from which this "oil of vitriol" has been manufactured, it is manifest that the experiments have been far too limited in number to determine anything like an accurate average of the sulphur contained in the various gases consumed in this metropolis, and we have reason to believe that the experiments referred to in the first report were made at a period when, from an unprecedented combination of circumstances, the gas companies were obliged, for a short period, to resort to an inferior description of coal, containing much sulphuret of iron, the gas from which required a larger amount of purifying power than had been provided for this unforeseen emergency. This want was speedily remedied, and there is but little chance of the recurrence of any similar disaster.

Were we disposed to fright the City from its propriety, we might, indeed, suggest such a multiplicity of contaminating influences in this great metropolis, that even Dr. Letheby's fearful tale would sink into utter insignificance: thus the present use of our common lucifer matches might be shown to far outweigh in dread sulphurous agency the contamination of the air we breathe; but this again sinks into utter insignificance, when we contemplate the number of coal-consuming fires, each belching forth into the already tainted atmosphere millions of cubic feet of unpurified gas, with all its noxious ingredients, unmitigated except by dilution. It is calculated, on good data, that coal contains fully one per cent. of sulphur, which is equivalent to the production of rather more than three of "vitriolic acid." One ton of coal would therefore produce about 67¼ lbs. of this "highly corrosive compound;" and, if the consumption of coal in the metropolis for domestic purposes, &c., be assumed at three million tons, we shall have, according to Dr. Letheby's deductions, no less a quantity than 201,750 lbs.!!! passing annually into the atmosphere.

Again, taking these "*deductions*" in another point of view, the ton of coal will yield nearly 10,000 cubic feet of ordinary gas, and, according to the lowest result of the *experiments*, will furnish 1500 grains of "oil of vitriol;" but the ton of coal, if burnt in the open fire, would, by the same rule, yield 470,750 grains, so that the difference, or 469,250 grains, or rather more than 67 lbs., has been removed by the gas companies from each ton of coals which they manipulate; and as about 500,000 tons are thus annually consumed in the metropolis for the production of light and heat, the public have good cause, even on these exaggerated grounds, to be grateful for so great a boon as is conferred by coal gas, and it should prove a powerful argument for its more extended use for domestic purposes in place of coal.

We can scarcely be surprised to find that the mortality of towns is increased in proportion to their size and crowded condition. The wonder seems to be how anything like health can exist within their boundaries; but we are positively astounded when we find, in contradiction to our supposed increasing misery, that the tables of mortality show us that, so far from modern improvements having been destructive of human life, we have the positive fact of increased longevity to allay all useless fears, and to encourage every one to lend their individual efforts to the progress of improvement, and pause ere they assist to decry one of the greatest discoveries of modern times, which confers on all around the inestimable and acknowledged benefits of increased light and heat.

Here, then, it may be well to consider whether part of this improved condition as to health be not attributable in some degree to the action of the sulphurous acid, not "oil of vitriol," which is continually passing off from our coal fires, uniting with and destroying many of the fœtid animal and ammoniacal exhalations from the crowded poor and the sweating labourer. It is even admitted in this report, after having created sufficient alarm by the terms "oil of vitriol" and "vitriolic acid," that a "*large portion* of this

---

* The directors of the Chartered Gas Company have printed this report, together with Mr. L. Thompson's able essay "On the nature and chemical properties of coal gas," as a pamphlet, for distribution amongst their consumers.

† When in the concentrated form, which renders Dr. Letheby's statements so fearfully appalling.

'dangerous compound' would doubtless be NEUTRALIZED by the AMMONIA of the gas and by that of DECOMPOSING ANIMAL SUBSTANCES." If a *large portion* of the minute quantity of sulphur compounds at times contained in coal gas are admitted thus to unite with these *really poisonous exhalations*, and thus neutralize their baneful effects, it is but rational to conclude that the sulphurous acid, whether from our coal fires or our gas, is performing an important function in disinfecting the atmosphere of this densely crowded city of much of its poisonous and putrescent miasm.

But is this *large portion*, which is thus admitted to *unite* and *be neutralized*, estimated, and deducted in the report from the whole quantity? On the contrary, the report proceeds thus:—MUCH would remain in a free state, and *be the source of incalculable mischief*." How or in what way this *incalculable* mischief is to arise, we are not informed.

Having thus, we trust, shown the comparative minor importance of Dr. Letheby's alarms, we would not for one moment hinder the adoption of any means by which the benefits of gas may be further extended and improved; but, instead of decrying the utility and impeding the employment of gas by alarming the public mind, we would beg to annex a few practical suggestions by which its use, even in private houses, may be beneficially extended and enjoyed.

For the purposes of illumination, whether gas, oil, or candles be employed, *imperfect* combustion is essential to the production of light. If sufficient oxygen combine with the carbon contained in the gas to insure its perfect combustion, heat and little light will be the result. If too much gas be allowed to pass off unconsumed, smoke, waste of the gas, and still greater contamination of the air, will ensue. A proper regulation of the gas is therefore essential, both for economy and health; and we may observe that, with an equal amount of light, whether from gas, oil, or candles, a similar vitiation of the air of an apartment would, we feel assured, generally result.

When gas is emyloyed for the generation of heat and culinary operations, *perfect* combustion should be insured, not only as economical, but also as eliminating the smallest amount of unpleasant products.

To the necessity of equivalent ventilation, it is hardly requisite to direct attention, where increased light and heat are introduced into an apartment; improved health would, no doubt, be the result of a greater introduction of fresh air and the removal of vitiated air, and in any case the upper portion of the room must no longer be hermetically closed.

H. B. LEESON, M.D.
ROB. WARINGTON.

Correspondence.

GAS TAR AS A MANURE.

SIR,—Having a few months past addressed to the editors of two papers some letters on the potato disease, and having recommended the use of antiseptic manures as calculated to arrest the potato blight, whilst the adoption of putrescent manures increases the disease; and having also stated therein the value of gas tar as an antiseptic manure, I am now in a position to inform you of the success of some experiments tried here this year. In order to test the efficacy of tar as a manure for potatoes, four trenches, about 30 yards in length, were made last spring. The first two having been dug 9 inches deep, the tar was poured thinly into them, and covered with a little soil. The other two trenches were prepared in the the ordinary way, and the same seed was planted on the same day in the four trenches, 10 inches apart from each other. When the haulm and leaves appeared, the deeper green colour of those in the tarred rows made them easily distinguishable from the others, they continued, also, more vigorous until autumn, when, on taking up the potatoes, they were found not only free from disease, but also from the atttacks of worms, the soil during their growth being almost exempt from weeds. The haulm and leaves of the other two trenches died down nearly fifteen days sooner, presenting a weak, sickly appearance. The produce when taken up proved to be not only 30 per cent. less than that obtained from the tarred rows, but one-third of them were diseased. The idea prevailed that the flavour of the potato might be tarry: I shall have pleasure in sending you a few to judge more satisfactorily of the absurdity of this notion. The present weak and consumptive state of the potato, induced, as I conceive, by the use and over-stimulation of putrescent manures, has rendered it more susceptible to the "ozonetic" condition of the atmosphere; while, on the other hand, it has been proved that antiseptic manures give stamina and vitality to the potato, and fortify it for a more successful contention with the blight.

Tar, when dug in the soil, is supposed to undergo decomposition, and to furnish a supply of carbonic acid to the roots of plants, being practically destitute of nitrogen. The cereals, which as food give more flesh-farming matter, require more nitrogen than the potato, which contains little gluten in proportion, but a larger quantity of starch. It will be seen by the following analysis of Professor Balfour, that tar is peculiarly adapted for supplying the largest proportion of the component parts of the potato:—

Carbon	441
Hydrogen	58
Oxygen	439
Nitrogen	12
Ash	50

In 1000 parts.

I trust I shall not be trespassing by adding a few observations opposed to the unsanitary views of the "oil of vitriol" and "gas poison" visionists. The public, according to the opinions of these gentry, exist in an atmosphere poisoned with gas; and, according to their theory, wherever gas is used, mortality must in undue proportions increase. "It oozes" say they, "from the soil, it rises from every area, and fumes out of every neglected basement." Are we, then, to infer from the above assertions, that "offensive emanations from decaying animal and vegetable substances, from undrained and untidy dwellings, from unclean clothes and ill-washed skins, from the noxious effluvia, which slowly decaying bodies, in hidden vaults and graveyards, are giving off," exercise no poisonous influence in producing deadly malaria? It appears to me a question worthy of investigation, as to how far the burning of gas in houses, &c., has tended to neutralise the "ozonetic" condition of the air, and restored it to a more healthy state during cholera, &c. Mr. A. Mayhew remarks, "Wherever this pestilence has raged amongst us, it has been found that the air is strongly charged with a quantity of what chemists call 'ozone.'" Ozone is a most powerful oxidiser, and oxygen is inert unless moisture be present. Ozone is destroyed by hydrogenated gaseous compounds. Sulphuretted hydrogen is so good an antidote to this body, that at La Petite Ville, in Paris (the place to which all human excrement of the city is carted), none of the nightmen were attacked by the disease. Ozone unites chemically with coal gas. It is known, that men employed at gas-works, where large quantities of olefiant gas are always being produced by the distillation of coal, were exempt from cholera. Ozone is composed of 1 hydrogen and 2 oxygen. To destroy this body the easiest method is to burn sulphur. "Ozone," says Faraday, "instantly transforms the sulphurous and nitrous acids into sulphuric and nitric acids.... An excess of oxygen in the atmosphere produces disease in plants containing sugar, glucose, and fecula, such as the vine, beetroot, and potato." The English troops, encamped on rising ground near Varna, escaped the cholera, until a violent thunderstorm came, after which they were suddenly siezed with it. The potato disease has been noticed after a thunderstorm. The great fire at Varna had a most beneficial effect in diminishing the deaths by cholera. It totally disappeared from Berlin after a fire which consumed many houses. I am led to infer from the above facts, that the burning of gas so far from poisoning the atmosphere does good; and that the poor, who have not the advantages of its sanitary influences, are on that account more liable to attacks of cholera. "The rain, as it passes through the air, carries down those accidental vapours which, though unwholesome to man, are yet fitted to assist the growth of plants. It thus purifies the atmosphere and feeds the plants on which we live." On the data given by M. Barruel, of Paris, the weights of fertilising materials annually supplied to the soil of this island by rain amounts to about—

400,000	tons	ammonia
1,850,000	„	nitric acid
279,000	„	chlorine
640,000	„	lime
244,000	„	magnesia

Chemical analysis has shown that 5 tons of common farmyard manure contain about 40 lb. nitrogen, and that by fermentation during the first period, 5 lb. of nitrogen are dissipated in the form of *volatile ammonia;* in the second, 10 lb.; in the third 20 lb. Thus completely decomposed it has lost one-half of its valuable constituent. Now, considering the millions of tons of farmyard manure used in England only, it is evident that from the above source *millions* of *tons* of *ammonia* are annually diffused through the atmosphere which we breathe.

Many more facts revealed by the microscope might be brought forward as to the numerous fungi, &c., in the atmosphere; but enough has been stated already to prove that coal gas is not the cause of a poisoned atmosphere. Certain conditions of the atmosphere give rise to impurities all over the globe, which nature counterbalances by purifying agents; even the Esquimaux have not escaped the attacks of cholera. Let those who are commissioned to make experiments and investigations search in a right spirit, so as not to mislead the pulbic. JOHN MALAM.

Holmpton Lodge, Yorkshire, Nov. 15, 1854.

THE "OIL-OF-VITRIOL" CONTROVERSY.

SIR,—It may, perhaps, prove interesting to some of your numerous readers to learn that, through the liberal influence of Goldsworthy Gurney, Esq., permission has been granted by the Board of Works of the new Houses of Parliament to experiment upon the products of combustion generated by the burners which afford light to the House of Commons. I had yesterday an opportunity of collecting the condensible products from 32 "Bude" burners, consuming about 300 cubic feet per hour of the Chartered cannel gas. The

experiment lasted for 2½ hours, and produced a quantity of water, which on evaporation was found to consist of the formiate and sulphate of ammonia, with the formiate of a peculiar soot-smelling alkaloid. On distilling part of the solid products of this water with hydrated phosphoric acid, a pungent volatile acid passed into the condenser, which had the characteristic odour of formic acid, and reduced the salts of gold and silver to the metallic state. The soot-smelling alkaloid was liberated from another portion by caustic magnesia. Before employing the chloride of platinum to determine in the usual way the amount of ammonia, it is necessary to mix the saline residium with muriatic acid, and evaporate to dryness, so as to expel the formic acid, which otherwise is apt to reduce the platina salt, and thus lead to an error.

It is impossible to imagine a more suitable situation than the one in question for collecting the products from gas, and it is, I believe, Mr. Gurney's intention to permit any scientific gentleman who may desire it, to make experiments upon that subject.

The heat from the burners is, as might be supposed, very intense, and this has a disposition to crack the glass apparatus employed to hold the ice and act as a condenser. An accident of this kind occurred to myself, and I would recommend future operators to surround with cotton, or other non-conducting materials, those parts of the glass vessel which are not refrigerated by ice, as otherwise they speedily reach a very high temperature and crack.

I need scarcely add that there was no trace of free sulphuric acid; indeed, the small compartment into which the products of combustion from the gas of the House of Commons has been passed during the last twelve months, gives a sufficient answer upon this head; for the door-handles and other metallic portions of its contents, as well as the metallic tubes which serve to convey the burnt products, are quite unaffected. Even without chemical examination, the conclusion here is irresistible; but, to a real chemist, such an examination cannot fail to be equally interesting and demonstrative.

Nov. 29, 1854. L. THOMPSON.

OUR PATENT SYSTEM.

SIR,—In your article on "Our Patent System," I notice you mention my name in connection with Mr. Malam.

I also notice Mr. King's letter, by which it appears that he has had in use for sixteen years the very retort which I patented in 1852; and I have since been told that a friend of mine experimented with the same principle four years before that!

My patent embodied two distinct inventions: the retort with ribs or ridges, so as to give surface; and a combined apparatus, forming the hydraulic main, condenser, scrubber or washer, and purifier: and it is some gratification to me to find that the result of the many experiments I made led me to adopt that form of retort which a man so eminent as M. King has been using for such a long time, as this implies the *principle* to be correct. I got the idea from a corrugated sheet of iron; and the form I eventually adopted and patented, I had never either seen or heard of before. My patent agents were particularly instructed to inform me if anything similar had been previously patented, and they replied, "there was nothing of the kind."

Your article advocates the abolition of the patent laws, on account of the many "comet-like" returns of patents in new forms, but similar in principle to others which have been patented before. If such were the case, in my humble opinion, the effect would be—that England would soon *cease* to be at the head of the mechanical world.

Why should I, or any other man, rack my brains, spend large sums of money in experiments, and, after much toil, bring them to perfection; then give them to the public? A man's brains are part of his stock in trade; and, if one get remuneration for writing a novel, why should not another for his invention, when both are alike the offspring of his ingenuity?

There must, of necessity, be a "comet-like" reappearance of inventions. It is just possible that the very invention patented by Mr. Lowe, and which you quote as an example of originality—as preceding White, Croll, Kirkham, &c.—had been in use *previously*; indeed, the principle of decomposing water, as described in his patent, was known long before the date of that patent. The simple fact is, that all men are plagiarists, as scarcely an original idea enters a man's head in the course of his life. The wonder is, that, out of so many millions of minds, a single *original* idea ever escapes them. Even Le Verrier, when he justly might have expected his discovery of the planet Neptune an isolated one, and one which would astonish the world, was *himself* astonished at the singular coincidence of the same discovery, at the same time, by Adams, in this country. But, without taking up more of your space, I would suggest, so long as the patent laws do last, that you CLASSIFY those which appear in your columns monthly, and which, I apprehend, are all there are relating to *gas, and give a separate number once a year containing them all.* I am sure there are scores of inventors, in common with myself, who would only be too glad to pay anything in reason for such a classified list of the gas patents taken out in every year: it would be the means of preventing a great loss of time, and of money too.

St. Neots, Dec. 1, 1854. GEO. BOWER.

Register of New Patents.

EDWARD LAVENDER, 87, Princes-road, Bermondsey, for "*Improvements in apparatus for stirring and acting on matters subjected to heat in retorts.*" Patent dated April 10, 1854.

For the purpose of carrying out this invention, a retort capable of being caused to revolve is employed, which is not in itself new. Within this retort is placed a shaft or axis, having thereon a series of blades or suitable arms; and these blades are so arranged that they may be placed from time to time at different angles with the shaft or axis, by which the matters in the retort may for a time be simply stirred; at other times they may be moved to and fro in the retort, and at other times they may be moved towards one end of the retort, and discharged therefrom; and this is accomplished by varying the position of the blades. The shaft or axis also carries a scraper or arms, which, by the aid of springs, is constantly pressed towards or against the interior of the retort, and scrapes the inner surface thereof. At the back end of the axis are fixed inclined blades, and a scraper at the end, which cause the matters under process to be moved away from that end of the retort. The end of the retort has an opening in it, by which any vapour or product caused by the heat can pass away in that direction. The retort is supplied at the back end thereof, and the matters are discharged.

The inventor does not claim for any of the parts, separately, of the apparatus, but for their combination.

JOHN CUNDY, of Carrington, county of Nottingham, mechanic, for an "*Improved reflector, globe, or shade, for gas, candle, oil, and other artificial light.*" Patent dated May 11, 1854.

This invention consists in coating a part or parts of glass globes with some reflective substance for increasing the light in any desired direction. The globe may be of various sizes, and ornamented with colours of different hues over the reflective part or parts; and the inventor proposes to apply the reflective substance and colours in various parts, according to circumstances.

The light will be thrown with increased brilliancy upon any required spot, without any additional consumption of gas or other source of artificial light. The invention is also applicable to glass bells, fixed over gas, as burners, or other artificial light. The reflective substance which the inventor prefers is silver and gold leaf, and made to adhere to the glass by the use of gum; but any reflective substance, or composition which will adhere to glass, may be made use of.

The inventor claims the manufacture of reflectors for gas and other artificial light composed of glass, and rendered reflective in parts.

WILLIAM WAITE, for "*An improvement applicable to the construction of sewers, drains, and pipes, for the conveyance of sewage, water, or gas.*" Patent dated May 11, 1854.

This improvement consists in the formation of blocks or pieces for the construction of sewers, drains, or pipes, from irregular fragments of stone, or from gravel, or other suitable materials, conjointly or separately caused to adhere and made into a compact mass by means of bituminous cement, and lined or inlaid with zinc, glass, earthenware, or other suitable metal or material. The blocks or pieces may be cast in moulds, for which purpose the inventor prefers moulds constructed of plates of iron, and capable of being put together or taken apart by means of screws or wedges. The compound which he prefers for manufacturing those blocks or pieces, consists of 1 part, by weight, of the pitch from coal tar, such as retains some degree of toughness at the temperature of from 40° to 50° of Fahrenheit; 2 parts of chalk or ashes, or burnt clay reduced to powder, and from 4 to 6 parts of sharp sand, gravel, or stone dust. The quantities of these ingredients, however, admit of some variation, according to their respective qualities, which variations can only be determined by experiment. These ingredients, first being made thoroughly dry, should be immediately blended together by being constantly stirred in a suitable vessel in which the pitch or other matters are heated to a state of fusion. The blocks or pieces may be cast in the form of lengths of pipe, or segments of a circle, or other suitable shape; so that, when put together, they may constitute a sewer, drain, or pipe of the required form or dimensions. The lining is effected by placing a piece of zinc, or other suitable material, in its proper place in the mould, and casting the blocks, &c., upon the same. The inventor prefers the use of earthenware pipes, glazed or enamelled on their interior surface, making the coating of sufficient substance to withstand the pressure to which the pipes may be subjected; and, as a further means of strengthening the pipes, he proposes to place under them a slip of wood as a longitudinal sleeper, and cemented to the bituminous coating while in a liquid state.

The inventor claims for the manufacture of blocks from the mixture referred to, and also for the abovementioned peculiar mode of lining and strengthening the same.

THOMAS CHAMBERS HINE, Regent-street, Nottingham, architect, for "*A new method of applying glass in the ornamentation of chandeliers and other fittings required for gas, candle, oil, or other artificial light.*" Patent dated May 18, 1854.

This invention consists in the employment of glass in the form of beads and other like objects, and stringing the same on to metal or other tubes, chains, rods, or wires, so as to form a complete continuous covering thereto, each bead or other like object being separate and detached from the others. By this mode of ornamentation, the inventor proposes to give increased brilliancy and effect to chandeliers, wall-brackets, and other fittings required in the use of artificial light.

The inventor claims for this new method of applying glass.

ROBERT CROSLAND and WM. HOLIDAY, of Bradford, engineers, and JOHN HEATON, of the same place, moulder, for "*Improvements in apparatus employed in the manufacture of cast-metal pipes or tubes.*" Patent dated May 22, 1854.

These improvements relate, firstly, to combining a number of boxes used in the manufacture of cast pipes or tubes upon a rotating or other traversing carriage or frame, in such manner that the successive operation of "ramming up," applying the "core," "casting," and "taking out" the tube or pipe, as cast, may be simultaneously performed, with different moulding-boxes of the series, as in their traverse they come up to the positions appropriated to these separate operations: also, to forming each of such moulding-boxes capable of opening in the direction of the light, to free the pipe or tube, when cast, and thus facilitate its removal; and with the core-seat at the bottom thereof turning on a hinge joint, but capable of being held in position by pin or other suitable fastening, which, when released, allows the sand to escape, and frees the casting. When dry sand is employed, the moulding-boxes, after being prepared, are in their traverse subjected to heat before they arrive at the point where casting is effected.

The improvements relate, secondly, to arranging a pair of endless chains (passing over suitable guide-wheels) with carriages to receive the ends of core bars, and to conduct the cores formed thereon into and from a drying-oven or chamber, the openings to and from which are so arranged that, whilst a core is being admitted to be dried, a dried core is also allowed to pass out therefrom, the opening or openings being only of sufficient size to admit of the transit of the cores and their carriages.

The inventors claim the arranging and combining parts of apparatus for drying cores used in the manufacture of cast-metal pipes and tubes.

Ernest Radigan and Raimond Gabriel de Grimouville, of Paris, for "*Certain improvements in glasses, shades, and smoke-plates used in gas and other lighting.*" Patent dated May 23, 1854.

The object of this improvement is to render less frequent the breakage of glasses, shades, and smoke-consuming plates used for gas and other lights. The inventors propose to effect their purpose by slitting those articles longitudinally, or in any direction, so as to allow for the expansion and contraction to which vitreous matter is subject upon heating and cooling. The slit, or fissure, may be made during the process of manufacturing, or blowing, or subsequently cut in the glass.

The inventors claim for the application of this slit, to allow the glass to expand without breakage.

Legal Intelligence.

COURT OF QUEEN'S BENCH.

Tuesday, Nov. 18, 1854.

(Before the Lord Chief Justice and a Special Jury.)

EQUITABLE GAS COMPANY *v.* JONASSOHN.

This was an action brought by the Equitable Gas Company against the defendant, an extensive coal proprietor, for breach of contract, the defendant not having delivered a certain quantity of coals according to agreement. The plaintiffs claimed £500 damages.

The defendant pleaded that he could not fulfil his contract owing to a strike in his mines.

Mr. Bramwell, with whom was Mr. Lush, appeared for the plaintiffs, and Mr. Manisty for the defendant.

Mr. Lush having opened the pleadings,

Mr. Manisty said the defendant could not support his plea by evidence. He admitted that there had been a breach of contract; and the only question which the jury would have to consider, would be the amount of damages to which the plaintiffs were entitled under the circumstances.

Mr. Bramwell said it was a well-known rule of law, that if a person engaged to furnish a commodity at a certain price, and did not do so, the person with whom the contract was made could go into the market and provide himself with the article required, and charge the other party with the difference in price. If A agreed to deliver coals to B on a given day in this month at 20s. a ton, and did not do so, and that when B went into the market to buy them they were 30s. a ton, then B's claim on A would be 10s. a ton for every ton of coal contracted for in the first instance. In this case the defendant had agreed, in June, 1853, to deliver to the plaintiffs 2000 tons of coal at the rate of 330 tons per month, from June, 1853, to the end of November, 1853, at 14s. 3d. per ton: only 990 tons were delivered. Now as the remaining 1010 tons were not delivered by the defendant according to contract, the way to estimate the damages sustained by the plaintiffs would be to charge the difference between the price of coals in August and that which coals cost at the end of November (for there was no breach assigned in respect of non-delivery in June or July). But the plaintiffs claimed a larger amount; for when Mr. Jonassohn failed to deliver the coals, he said—"I am not to blame—there is a strike in the pits." Well, although that might be the case, yet he was at liberty to deliver the coals at a future date; but the plaintiffs, under those circumstances, were not at liberty to go into the market and buy coals, charging him with the difference of price. The defendant, however, went on saying he could not deliver the coals (the strike being all moonshine); and it was not until the month of January, 1854, when the plaintiffs were short of coal, that they went into the market. If Mr. Jonassohn had said at an earlier period—"I am sorry to say that it does not suit me to deliver coal at the contract price," then the plaintiffs might have gone into the market and purchased before the price had risen so high as they were in December and January. It was agreed, that if there had been a strike, or a frost in the river Thames, the defendant would not have been bound to deliver the coals; there would, under such circumstances, have been no breach of contract; but now the defendant said—"I broke my contract on Dec. 12, and you ought to have bought your coals then." He (Mr. Bramwell) would show what the price of coals was in December and January, and it would then be for the jury to determine what damages were sustained by the plaintiffs on account of the breach of agreement. He would call witnesses, and it would be then for his learned friend, Mr. Manisty, to show what objections the defendant had to the plaintiffs' mode of estimating the damages.

Mr. *James Dixon* was then called, and examined by Mr. Lush.

I am a factor on the Coal Exchange, and was agent for the delivery of the coals known as Leverson's Wallsend coals. I have not got the prices of those coals, but I have the prices of coals of a similar character. Mr. Jonassohn, the defendant, was not the sole owner of the coal mines, he was a partner in the concern. I have not got the prices of Leverson's Wallsend coals, because there were no coals of that name in the market in August last. I am not prepared to say that they were in the market in October. The price of coals of an equal quality with Leverson's, in the early part of August 1853, was 14s. 6d. per ton; but I may observe that the market advanced, and during the month the average value would be 16s. I have not got the prices at the end of August, but in the first week of September they were 19s. Coals advanced considerably till December. The price did not advance in September, October, and November. The average price in October was 19s., and the same at the end of October. It was 20s. in November, and 26s. at the end of December. The average price in December was 25s. In January the average price was 30s. The charge for lighterage was about 6d. a ton.

The Chief Justice: The lighterage would be the same.

Witness: Yes.

Mr. Bramwell: This gentleman is giving the market price of coals as delivered at our wharf.

By Mr. Lush: I bought in December a cargo for the Equitable Gas Company, amounting to 391¼ tons at 26s. per ton. We did not pay the lighterage in that case—the company paid it.

Cross-examined by Mr. Manisty: I did not know of any sales of Leverson's coals in August, but I knew of sales of coals of a similar quality in that month. The price (and I am speaking from recollection) of coals at the end of December was 26s.; we afterwards advanced till we reached 38s. I am not a factor of the Equitable Gas Company, but I did business for them. I did not buy coals for them during August, September, and October. I think the stock of the company was short during that time. I know they wanted coals, and I am not aware that they got them. There was 4d. a ton allowed off the price of coal for trade allowance.

By Mr. Lush: The purchaser has that trade allowance, and it comes off the price. The average price for the month of August would be about 16s.

Mr. *Samuel Andrews* examined by Mr. Bramwell.

I am secretary of the plaintiffs' company. We had no coals from the defendant in August, October, and November. I cannot say I have seen the defendant write, but I have received correspondence from him, and I spoke to him afterwards on the subject of it. I received these documents as his. [Witness then handed in several letters.]

Mr. Bramwell said he would not trouble the court by reading more than a few extracts from those letters. In one of them, dated Oct. 30, 1853, and directed to Mr. Andrews, the defendant said—"I beg to inform you that my colliery has left off work for some time, and until they resume it will be out of my power to make shipments." On Oct. 9 he said he would be soon able to ship coals. On Nov. 14 he said—"I am unable to ship coals for you, but will do so as soon as it is in my power;" and in December he repeated in substance the same.

Witness resumed: Mr. Elmore was the lighterman. The lighterage was 1s. a ton, for in consequence of the Thames being frozen extra cost was incurred by the lighterman. The lighterage came to £19. 11s. 6d., and the coals cost 26s. per ton.

Mr. *James Scott* examined by Mr. Lush.

I am clerk of the coal market. I know the coals called Leverson's coals. About 6000 tons of those coals were brought into the market from October to December, from the port of Sunderland, and a much larger quantity of the same class from Newcastle. I am not acquainted officially with the price of coals in the market.

Mr. *A. J. Duff Filer* examined by Mr. Bramwell.

I am committee clerk of the Imperial Gas Company. Our company consumes the defendant's coals. We had arrivals of Leverson's coals from August to January, both by water and by rail. We received them in August, September, October, November, and December, 1853, and January of the present year.

Mr. Bramwell: I think you shipped 3400 tons in August?

Mr. Manisty: What has this to do with the case?

The Chief Justice: The breach of contract is admitted, and the only thing you have to do is to settle the damages.

Mr. Bramwell: Then I will go no further in that direction. What was your company giving in January of the present year for Leverson's coals—buying them in the market without any previous contract?

Witness: We gave 25s.

Did you buy any in December?—No.

Any of a similar quality?—Yes; we bought in December various quantities at 21s., at 20s. 6d., and 21s. 3d. In November the prices were 19s. 6d. and 20s.

The Chief Justice [to Mr. Bramwell]: Be good enough to state the exact sum you seek. Gentlemen of the jury attend to this calculation, as you will have to exercise your judgment on it by and bye.

Mr. Bramwell: I will put before you the figures. I see from the correspondence, that we were entitled to suppose that Mr. Jonassohn could not deliver the coals on account of the strike; but it was not until January we knew that he had broken his contract. The account stands thus:—

	£	s.	d.
Cost of 391¼ tons, on Dec. 30, 1853, at 26s. per ton ..	510	11	0
Lighterage of same	19	11	6
	£530	2	6

Now, had Mr. Jonassohn delivered us an equal quantity at 14s. 3d. per ton, the contract price, it would have only amounted to £276. 18s. 10d., which would be £251. 3s. 3d. less than they cost us. Now, that is our actual loss on that quantity. That still leaves 619 tons undelivered. Now, as to these, we will take the lowest figures. Assuming the price of coals from October to January inclusive to have averaged 23s. per ton, then the price of those 619 tons would be £711. 17s.; from which, if you deduct £441. 0s. 9d., the contract price, there will be a balance of £270. 16s. 3d. due to us. This sum and £251s. 3s. 3s. would make the defendant indebted to us £521. 19s. 11d., of which we only claim £500. This is the way in which we make out our claim; but I suppose my learned friend will say we ought to charge the defendant with August, September, and October prices, and not with January prices.

M. Manisty said, he would only make a few observations on the case. The question was, how much the defendant should pay for not having delivered—say, in round numbers—1000 tons of coal. He admitted that the defendant had broken his contract, as he did not think it right to trouble the court with any evidence that would not amount to a legal defence. He thought, however, he could show many circumstances that would palliate, though not excuse, the breach of contract. They were all aware of the state of the coal trade in November last, and they must see that the defendant's was a hard case. Many persons, in the course of business, had made contracts which at the time they believed they could execute, but which afterwards they found impossible to do so from the force of circumstances. The defendant was unfortunate in not being able to supply the coals. No doubt, the plaintiffs had a right to go into the market and supply themselves; but it was rather hard that a party who was acting fairly by them should have this hardship put upon him; that they should go into the market and get a cargo at the very moment when coals were at the highest price, and then try to get the difference between that and the contract price. If the plaintiffs intended to pay the highest price, they should at least have given the defendant the opportunity of getting the coals for them: they were, in fact, trying to make money out of the defendant's misfortune. Mr. Filer's evidence put this beyond a doubt; for he stated that in December they had had various quantities of coals, of a similar quality, delivered at 20s. 6d. and 21s. Why, then, did not the plaintiffs, when they found the defendant not delivering the coals, buy in December?

The Chief Justice: They do not put it on the ground that coals could not be purchased in the market, but that they had reason to believe that the contract was not broken, and thought they should look to your client for its fulfilment. The defendant said the mine was stopped.

Mr. Manisty: In the month of October the defendant said, "My colliery has not been at work for some time."

The Chief Justice: It goes on to January. In November he said, "I hope I shall be able to supply you."

Mr. Manisty: The colliery being stopped would not be a legal defence. The colliery was out of work some time, but not so as to justify the defendant in breaking his contract. He was unable to supply coals; and they wait until the very time when coals are at the highest, and then they come down upon him—they pounce upon him. They buy a cargo of coals at a very high price, and then say, "Pay us the difference between this and the contract price." I say they had no right to do that.

The Chief Justice: Gentlemen of the jury, this is an action brought against the defendant for not delivering the coals according to his contract. Now he sets up a defence that he was justified, there being a strike in the collieries; for there was a condition in the contract, that if there were a strike, he was not bound to deliver. But then he produced no evidence to show that he had been prevented from delivering by a strike; he acknowledges that he did not deliver. The only function you have to perform is, therefore, to assess the damages. Now, in my opinion, if the plaintiffs were led reasonably to believe, and did believe from the defendant's letters, that the strike was the cause of the delivery not taking place during August, October, and November, as has been stated, and that they were led to believe that he still would give the coal, I think you are justified in assessing damages according to the market price of coal in January of the present year, when the plaintiffs discovered that the contract had been really broken. If on listening to the correspondence you come to the conclusion that the defendant represented that a strike occured, then they were justified in waiting till the strike ceased, and the coals were delivered according to the contract. If they were induced by the representations of the defendant not to go to market till January, then you are to assess the damages according to the market price in January. But if you think they were not induced by those representations to wait till January, then the damages should be assessed, not according to January prices, but according to those in other months.

The jury returned a verdict for £521. 19s. 11d., the full amount of the difference, but the plaintiffs only claimed £500.

Miscellaneous News.

CITY OF LONDON COMMISSION OF SEWERS.

Guildhall, Nov. 14, 1854.

ALLEGED NUISANCE OF THE CITY GAS WORKS.

Mr. Saward, who appeared before the City Commission a few weeks ago, and complained of nuisance arising from the City gas works, again attended for the purpose of answering some of the statements contained in the report of the medical officer, presented to the court at its last sitting.

Mr. H. L. Taylor submitted that Mr. Saward must send either a memorial or written statement of his complaint to the court, otherwise he had no *locus standi*. A mere verbal statement could not be entertained.

Mr. T. H. Hall said that before the chair was taken, he had informed Mr. Saward he was apprehensive that the statement of that gentleman could not be received in the way he proposed to make it.

The Chairman: If Mr. Saward will commit to paper the statement he wishes to make, the court will be most happy to entertain it. The regular course will be to embody his ideas in a memorial, instead of criticising the report of the medical officer.

The Medical Officer said, that before Mr. Saward commented upon his report, he was desirous of sending that gentleman a corrected copy, having noticed some slight errors in the one that had been printed.

Mr. Saward: During the last seven or eight years I have been calling the attention of this court to this very nuisance, and have expended a great deal of time and trouble in doing so. If I am to be met by a mere matter of form when I come to complain of a nuisance, the existence of which everybody admits, I have nothing further to say upon the subject, but must leave the commission to deal with the matter as they think proper.

Deputy Holt said he was quite sure that the court would agree with him in thinking that Mr. Saward had nothing of which he could with justice complain. That gentleman had been told by the chairman that he was proceeding informally, and that if he proceeded formally, and presented a memorial, it would receive proper attention.

Mr. Ross: Is it not a fact that the nuisance caused by the City gas works is still in existence?

Mr. Saward: Certainly, every day the works are going on.

Mr. Ross: Legal proceedings have been taken, and the nuisance is not abated?

Mr. Saward: Precisely so.

A Member of the Court: I know that the City Gas Company are doing everything in their power to abate the nuisance, and are incurring great expense with a view to this end.

The medical officer was accordingly directed to send a copy of his report to Mr. Saward.

Guildhall, Nov. 28, 1854.

Mr. Daw read the following communication from Mr. Saward:—

Promoter Life Assurance Office, 9, Chatham-place, New Bridge-street, Nov. 27, 1854.

"Gentlemen,—I am still of opinion that much of your valuable time, as well as mine, would have been spared, had you permitted me the other day to make the few remarks I was desirous to do on Mr. Simon's report on the nuisance occasioned by the City gas works, of which I had complained; but, since you decided that I must address them to you in writing, I comply with the regulations of your court; and—

"First, I beg to observe that, able as Mr. Simon's report is in giving you a detailed history of the process of making gas, and valuable as it is in establishing that the City Gas Company commits a nuisance in three distinct stages of their process, yet you will not fail to see that he does not touch on the nuisance of which I more immediately complained; nor does he show that he ascertained by personal experience what was the effect produced by the company letting their waste water off into the Thames, or what influence the nuisance produced thereby must have on the health and comfort of those affected by it. These, I consider, are most important omissions.

"Secondly, it is a mistake to suppose that there is any reason why your court should not at once take immediate steps to abate this nuisance, on account of the proceedings instituted by the corporation against the Gas Company being pending. There are, in fact, properly speaking, no proceedings pending. About three years ago the company was indicted for a nuisance by order of the Lord Mayor. About a year and a half ago the company confessed judgment; and it was understood that, unless the nuisance was abated by a specific time, they were to be brought up for sentence. That time has expired: the nuisance still subsists, and is daily repeated. The question, therefore, which your court has to consider is, whether the company shall be called up for sentence, having failed to fulfil their undertaking, or whether fresh proceedings shall be instituted against them. You cannot influence a judgment that is already recorded.

"Thirdly, it must be remembered that the Gas Company commits a nuisance in two ways: it infects the air, and it infects the water. When cleansing the retorts and condenser, which must be done every twenty-four hours, the noxious gases of which Mr. Simon speaks are discharged into the air (and that was the nuisance for which the company was indicted three years ago). By letting their waste water off they infect the Thames, and cause the nuisance I now complain of. It is said that the new works which had been so long promised will abate the latter nuisance; but it is perfectly well known that they will leave the former untouched. It is obvious, therefore, that, when the company has done all that it contemplates doing, the nuisance will not be effectually remedied.

"The request, therefore, which I have to make to you is, that the matter may be referred back to your officer of health, Mr. Simon, for him to ascertain by personal experience what is the effect of letting gas water off into the Thames, and to report, when he has so done, to your court what its influence on the health of the public must be; and, in the event of his reporting, which I have no doubt he will do, that it is most prejudicial, that your court will order immediate steps to be taken to remedy the nuisance.

"Before I conclude, it is right that I should explain that it is entirely through the letter which I addressed to the Board of Guardians of the West London Union having been sent on by them to you, and which I did not contemplate, that I now appear in this matter individually before you; but it is proper that you should understand that my complaint is shared in not only by the inhabitants of Chatham-place and New Bridge-street, but by the residents in the Temple, in the houses in the Strand near the river, by the gentlemen at Somerset House, and by the proprietors of the steamboats which stop at Blackfriars-pier. "M. Saward.

"To the Commissioners of Sewers of the City of London."

"P.S., Nov. 28.—I cannot possibly attend the court to-day. I will do so next Tuesday, if it is desirable; but this letter pretty fully expresses my views."

Mr. Ross moved, "That the letter be referred to the medical officer."

Mr. H. L. Taylor opposed the reference to the medical officer, on the ground that that gentleman had already fully reported upon the subject of which Mr. Saward's letter treated.

The motion, however, was carried.

EQUITABLE GAS LIGHT COMPANY.

The Half-yearly Ordinary Meeting of the Shareholders of this Company was held at their offices, John-street, Adelphi, on Tuesday, Nov. 14, for the purpose of receiving the report of the directors, and declaring a dividend upon the capital of the company, for the half-year ending June 30 last.

Among the directors present we observed Colonel Henderson, chairman; J. Wheelton, Esq., deputy-chairman; Messrs. Pratt, Holdship, B. Kelly, Van de Wall, and G. H. Pinckard Among the proprietors present we noticed Sir James Duke, Bart., M.P.; J. Hadland, Esq.; E. Wait, Esq., &c. &c.

At one o'clock precisely the chair was taken by Col. Henderson.

Mr. Samuel Andrews, secretary, having read the advertisement and circular convening the meeting, and also the minutes of proceedings of the previous meeting,

The Chairman asked, was it the pleasure of the shareholders that the minutes of the last meeting should be confirmed?

Mr. Box inquired whether the proposition he had made at the last meeting, to increase the dividend to 4 per cent., had been entered on the minutes?

A Shareholder: That proposition was withdrawn, and it was unnecessary to enter it on the minutes.

The Chairman: It was not necessary to enter the amendment on the minutes, as it was not carried.

Mr. Box: The amendment was proposed and seconded, and why did it not appear on the minutes?

The Chairman said it was not of much importance, as the amendment was withdrawn by Mr. Box himself.

The resolution for the confirmation of the minutes was then put to the meeting, and unanimously agreed to.

The Secretary then read the following report and statement of accounts:—

"You are invited to assemble on this occasion to receive from the directors a report of the company's proceedings for the half-year ending June 30 last. If the state of the accounts now submitted for your inspection be considered in connection with the period to which they refer, it is believed that you will be satisfied with the result they exhibit; for the early part of the time embraced in these accounts was beset with more than ordinary difficulties, and which there is no doubt are still fresh in the recollection of all present. Yet, notwithstanding these opposing circumstances, your directors have the satisfaction of again laying before you a continued improvement in the state of the company, both as regards the gas rental, which amounts to upwards of £21,000 for the half-year (that being an increase of nearly £2000 on any similar period), and likewise upon the net profit, which amounts to nearly £7400 for the same period; but it is necessary to forcibly impress upon your attention that the profit has been materially increased in consequence of the favourable contract your directors entered into for coals in the early part of 1853, and which extended to April of the present year: consequently you had the advantage of that purchase, as well as the increased return from the advanced price of coke, breeze, and other products, which has in some degree neutralised the increased cost of iron, bricks, labour, &c., as referred to in the last report.

"You were informed at the last meeting that a contract had been entered into for enlarging three gasholders; they are nearly completed, and will give 100,000 cubic feet additional storage, at a cost of about £2000, which will be of great advantage in the economy of working; and, it is believed, will render any further outlay for gasholders unnecessary for the present.

"Your directors have to report, that since the last meeting they have renewed the Debenture Bonds which fell due on the 13th inst., amounting to £6600, as recommended on that occasion.

"The Westminster Terminus Railway Bill, referred to in the last report, has received the sanction of the Legislature; and it is asserted that the undertaking will be commenced during the ensuing year. Your directors beg to assure you that a matter so important will continue to receive from them the attention it demands for the protection of your interest.

"The accounts now submitted to you have been examined and certified by the auditors. They show a manufacturing profit of £9013. 18s. 8d., from which is to be deducted £1033. 0s. 9d. for interest paid upon the borrowed capital of the company; £318. 0s. 3d., to be written off as bad debts, and other minor deductions, as there detailed, leaving a net profit of £7362. 3s. 10d. upon the half-year, to June 30 last; from which your directors recommend a dividend of 20s. per share, clear of income tax, that being at the rate of four per cent. per annum upon the capital of the company, leaving a balance of £3302. 3s. 10d., which they recommend should be carried to the credit of the suspended account, as heretofore; the whole of which surplus will be expended in payment of enlargement of gasholders, new exhauster, scrubber, and other works in progress."

Manufactory Account, from Jan. 1 to June 30, 1854.

Dr.		*Cr.*	
To tradesmen's accounts, for lime, &c.	£ 192 3 8	By gas rental, half-year to June 30, 1854	£21,306 4 3
To coals consumed	9,629 0 2	By coke account, proceeds of sales and stock	5,627 19 10
To wages, paid under this head	2,692 14 8	By tar	163 2 1
To rent and taxes, paid and due	374 1 7	By ammoniacal liquor ditto	171 4 0
To directors, paid	375 0 0	By discount and allowances on tradesmen's accounts	7 10 10
To auditors, paid and due	30 0 0	By the London Gas Company, for gas supplied them	17 9 1
To salaries, paid	830 14 10	By the Chartered Gas Company ditto	19 18 5
To collector's commission, paid and due	296 6 3		
To stationery, stamps, &c., paid and due	97 2 9		
To general charges, paid	145 8 3		
To gas allowance, amount written off	116 2 2		
To wear and tear, amount of account	3,520 15 6		
To profit and loss for half-year's working profit	9,013 18 8		
	£27,313 8 6		£27,313 8 6

Profit and Loss Account, from Jan. 1 to June 30, 1854.

Dr.		*Cr.*	
To dividends, for 21st dividend under Act of Incorporation	£3,000 0 0	By balance of unappropriated profits	£5,480 14 5
To interest, amount of account for half-year to June 30	1,033 0 9	By cash, for bad debts recovered	6 1 6
To bad debts, amount written off to June 30	318 0 3	By manufactory account, half-year's working profit to June 30	9,013 18 8
To general law charges, amount of account	31 16 4		
To income and paperty tax, amount reserved	274 19 0		
To suspended account, per resolution of general meeting	2,480 14 5		
To balance, half-year's net profit	7,362 3 10		
	£14,500 14 7		£14,500 14 7

Balance Sheet, June 30, 1854.

Dr.			*Cr.*	
To investment:—			By capital joint stock, received of proprietors	£180,722 10 0
Amount of account Dec. 31, 1853	£203,630 7 10		By tradesmen's accounts, due by the company	3,430 10 5
Do., charged this half-year	188 5 5		By taxes, balance due	88 6 6
		£203,818 13 3	By collector's commission, due	141 3 8
To gas rental:—			By auditors, due	30 0 0
Due to the company	12,049 0 11		By debentures, balance of amount issued	44,300 0 0
Outstanding accounts	476 14 10		By debentures, interest, balance to June 30, 1854	218 8 0
		12,525 15 9	By gas deposits, due to sundry depositors	155 12 9
To cash, balance in hand		2,364 1 4	By dividends, balance due to June 30, 1854	723 12 6
To tradesmen's accounts, owing for coke, &c.		1,087 12 11	By income and property tax ditto	216 5 1
To coke and breeze, stock on hand		107 9 3	By loan account ditto	2,502 1 1
To tar ditto		40 6 7	By profit and loss, balance of account, half-year's net profit	7,362 3 10
To ammoniacal liquor ditto		8 4 6		
To general stores ditto		1,415 3 2		
To coals ditto		3,454 9 5		
To service-pipes ditto		186 11 8		
To pipe-laying acct. ditto		395 1 9		
To meters, amount of account		6,791 13 6		
To the Chartered Gas Company, balance due		47 17 10		
To the London Gas Company ditto		51 2 0		
To suspended acct., balance Dec. 31, 1853	£10,167 5 4			
Less written off	2,480 14 5			
		7,686 10 11		
		£239,920 13 10		£239,920 13 10

The Chairman said that, before moving the adoption of the report, he wished to refer to the balance-sheet, a copy of which was on the table. It could not, he thought, escape their observation that the sum received, in round numbers, from proprietors, amounted to £187,892, whereas there had been expended for investments £203,818. Now, the difference between those sums had been paid out of their profits, and it showed in a remarkable way the solid position of the company. The next point to which he wished to draw their attention was the working capital, with respect to which they felt themselves much hampered. They felt that it was not sufficient to carry on their works, and hence they were frequently obliged to apply to their bankers, which was a painful thing. On the 30th of June they obtained a loan from them of £2000. The company had then a balance in hand equivalent to the sum borrowed, but they would all agree with him that they should have at least £5000 more of a working capital than they really had. Their net profits for the half-year amounted to £7362. If they took the the stock in hand, the assets of the company, and the debits due, they might be said to have a working capital of £13,809. From that was to be deducted the amount expended in meters, which was £6791. 13s. 6d. While on that subject, he might state that they deducted from the meter account 20 per cent. per annum on all the sums

carried to the credit of that account. Although the meter account was stated at that sum, yet the amount invested in meters was much larger. The whole of that sum was carried to the debit of the wear and tear account, and did not appear as attached at all to the capital account. Taking that from the £13,809, they would have an available working balance of only £7000, which certainly was not enough. He thought they ought to add £5000 out of the profits of the concern, to put the establishment on a better footing. Their present debenture account was £44,300. It had been £60,000, but they had paid off £16,000. They had given debentures to the Imperial Company for the purchase of their mains in the district adjoining their (the Equitable Company's) works. These debentures were at 4 per cent. This was a financial arrangement of which the company took advantage. Of the profits, the directors recommended that £4000 should be divided in the shape of dividends, which would give 4 per cent. on the full value of each share. He might say that this would be, according to the value at which some purchased their shares recently, equal to 8 per cent., but it would be 4 per cent. on the full value of the £50 share. He wished the directors could recommend a larger dividend, but he thought it would be impolitic to do so. They thought they would be able to continue that amount of dividend, otherwise they would not recommend it. This dividend was an increase of one per cent. on the last half-year. This increase was owing to the shareholders' forbearance in allowing the directors heretofore to apply a certain portion of their profits to the liquidation of their debts. He could only say that they were hampered exceedingly in matters connected with their business. They could not get coal-owners to make contracts for the delivery of coal as they used to do. The company were, therefore, obliged to freight or charter their own vessels; and they all knew that the price of coals had increased 30 or 40 per cent. within the last 15 or 18 months. With respect to the application of the surplus after the payment of the 4 per cent. dividend, he hoped they would agree with him that they could not lay it out in a more legitimate way than they had done. They had increased their gasholder room by 100,000 cubic feet, at a cost of £2000. If they had to construct a new 80-feet gasholder, it would have cost them a much larger sum; but they increased their present gasholders by the addition of a number of plates. Their three gasholders were telescope gasholders. He thought they had made a judicious application of their surplus. They had gone on for a great number of years extending their works. If those gentlemen who joined the company nine years ago, when he joined it, were to go now and look at their works, they would see the great increase that had been made, and that without calling for additional money or issuing additional shares. He thought it would have been a great sacrifice of their property to issue additional shares, considering they had been at so low a rate. They had applied their surplus revenue to the enlargement of their works, and this had placed them in the enviable position in which they then stood. They had likewise laid out money in extending their mains. When he joined the concern, they had a wastage of 45 per cent. upon the whole amount of gas manufactured. They then manufactured 160,000,000 cubic feet, so that the loss must have been enormous. That loss had been reduced, summer after summer, by examining their mains, until it was as low as 17 per cent. (Hear, hear.) He believed no company in London had reduced their wastage to so low a figure as that. London was peculiarly situated in respect to wastage. In the first instance, he did not think gas consumers were very scrupulous as to the mode in which they used their gas. There was a loose sort of morality in that respect. But the mains were subject to great disturbing influences. Just think of what would be the effect produced upon them by a large locomotive engine, weighing 20 or 30 tons, like the car employed at the Duke of Wellington's funeral, for example. The disturbing causes in the streets of London exceeded those of any other town. There was a certain amount of wastage in every company, in country as well as in town; but the wastage seldom exceeded 17 per cent. in the country. The company had, therefore, in this respect alone, saved a very large amount. The company at present manufactured about 240,000,000, and the difference of wastage between 17 and 45 per cent. on that amount would come to a large sum. (Hear, hear.)

Mr. Box said the saving would be very large indeed.

The Secretary: The saving would amount to 65,000,000.

Mr. Box: What is the increased production of gas for the last half-year?

The Secretary: The manufacture for the last half-year was about the same as for the previous half-year. In the months of March and April last, a very extraordinary circumstance, there was a general falling off in all the companies.

The Chairman then proposed that the report of the directors, together with the statement of accounts as examined and certified by the auditors, be received and entered upon the minutes.

Mr. Rhodes seconded the motion. He wished to know whether they were going to build a new exhauster.

The Chairman: Yes.

Mr. Rhodes said he would like to see the operation of the company's works. He had tried to do so, and was refused admission.

The Chairman: You can get an order that will procure you admission whenever you please. You can have one now.

In answer to a question from a proprietor,

The Chairman said they were now introducing clay retorts by degrees.

Mr. Box: I think the sooner we resort to clay retorts altogether, the better: the saving arising from them is very immense.

The Chairman: We are feeling our way, and giving them a fair trial; and I believe that before the year is over, half of our retorts will be of clay. I rather think, however, that the advantage of clay retorts has been overstated. A vast quantity of gas escapes through the clay, although we use an exhauster, so as to relieve the pressure, and work down at zero; still there is a large amount of loss. The clay retorts fur up, and require to be cleaned every fortnight or three weeks; the finer parts of the gas pass through the pores of the clay, and leave the carbon behind. However, as clay retorts are more durable, no doubt there will be an advantage in using them. As we work the clay retorts on both sides, that will increase our manufacturing power.

Mr. Box: Is there any increase in the last half-year in the working of clay retorts, as compared with the previous half-year?

The Chairman: It is chiefly since the 30th of June that we had experience of them. At our next meeting we shall be able to tell you more as to the results of our experience.

Mr. Box: I asked the question because there has been a considerable increase of profits during the last half-year, and I was desirous of knowing whether this was attributable to the increased use of clay retorts, or to the number of customers.

The Chairman: I think the report states one main cause of the increased profits to be, that we had a profitable coal contract, which extended to the end of April. Our sale of coke amounted to £5627, as compared with £3541 of the corresponding period, ending in June 1853. The increase on the sale of coke and breeze alone, in the present year, amounted to £2100.

Mr. Box: What is the increase on breeze?

The Chairman: Breeze and coke have been kept in the same account, and I am not able to state the precise sum for each.

Mr. Box: Will you be kind enough to keep the coke account separate from the breeze account in future.

Mr. Hadland: The breeze is but a small amount.

The Secretary: All the cartage and other matters are charged in the account, and this is the net proceeds.

Mr. Box: How much does the coke amount to?

The Secretary: I cannot tell you now, but I can show it to you down stairs.

Mr. Box said he had asked those questions previous to his congratulating the shareholders on the increased prosperity of the company. When he compared the gradual increase of rental, he was glad to find that, notwithstanding the increase of 6d. a ton in the price of coals, the rental was yet £2000 more than that of the last half-year.

Mr. Box: The increase of rental, he was glad to find, arose from a steady increase of certain customers. Formerly a great portion of the rental arose from casual circumstances, such as the lighting of public institutions and places of amusement. The income from them was very uncertain, and there was sometimes a loss.

A Director: There never was a loss but the income was uncertain.

Mr. Box thought there was sometimes a loss. However, there was not so much of their income arising from that source as formerly. The increase, being from steady customers, was much more favourable to the company than if it arose from casual and uncertain customers. He was glad to hear the explanations given by their worthy governor. (Hear, hear.)

Sir James Duke: Is there any rental from meters?

The Chairman: Yes.

Sir James Duke: Is that rental equal to the large deduction of 20 per cent.?

The Chairman: We make that deduction from our own receipts, for a deterioration fund. This is amalgamated with the gas rent.

Sir James Duke: It ought to be separate.

The Chairman: It is all included in the £21,000.

Sir James Duke: We ought to see, in some way, how that 20 per cent. is deducted; we ought to be able to see whether we have a loss on that capital employed, or a profit. I am not making this remark by way of complaint.

The Chairman: At present my view is this: the meter charge is included in the £21,000; and, I dare say, our meter rental, if we separated it, would amount to £1000 a year. We do not separate it from the gas account. They both stand in one joint account.

Sir James Duke: I wanted to see that we were not giving away our meters without some return.

The Chairman: I must have been misunderstood about the meters. That amount of £6791 does not represent the capital. We have been deducting from that capital 20 per cent. per annum to keep that fund low, so as to account for wear and tear.

Sir James Duke: I know you have got a valuable officer in your secretary, and that in future he will show how that stands. (Hear, hear.) We ought to have a specific meter account, for that is a large deduction from a small capital for meters.

The Chairman: It is.

Sir James Duke: I think the secretary should, on some future occasion, show us how the account stands.

Mr. Van de Wall: The meter account always was a loss; but it had this advantage, that it induced the public to burn by meter instead of by contract, which was to the detriment of the company.

Mr. Pinckard: We write off £1400 or £1500 a year for meters.

The Chairman: But one is capital and the other is revenue. We get a revenue of £1000 a year from £6971.

Sir James Duke: I am quite sure the accounts are highly satisfactory, and I make these remarks rather to elicit information than to find fault. I know there are companies imposed upon by frauds on their meters, but I am sure this company will secure themselves by vigilant inspectors.

A Director: We would wish the customers to supply their own meters.

The resolution was then unanimously agreed to.

The Chairman then moved, "that dividends out of the profits of the concern, of £1 per share, clear of the income tax, be declared, payable on and after Friday, Dec. 1 next, Saturdays excepted; and that the balance of the profit and loss account, amounting to £3362. 3s. 10d., be carried, as heretofore, to the credit of the suspended account." I hope that in 1855 we shall have this account paid off. When I joined the company, this account amounted to £53,000. If we have a balance of £1500 or £2000 next year, we can employ it to increase our working capital.

Mr. Rhodes seconded the motion.

Mr. Box congratulated the secretary and board of directors on the progressive prosperity of the company. Everything appeared to him to be very satisfactory, so far as the accounts were concerned. He would be one of the last of the shareholders to push the directors into a corner for want of means; but to him it appeared that this suspended account was a a mere fiction—mere figures, and not a reality. They had reduced it nearly £35,000, and now they proposed writing off £3300 more. Where did all this go to? Not to paying off any debt. The surplus property every half-year went to the floating capital.

The Chairman: It went to the paying of bonds: £1500 was paid last half-year.

Mr. Box meant the floating capital, including this £2300; and then they would have a floating capital of £18,000.

Mr. Van de Wall: Oh, no; we laid out £2300 on gasholders last half-year.

The Secretary: Then there is a large amount for wear and tear.

Mr. Box: That comes out of the manufacturing account, which leaves a balance of £9000.

The Secretary: The last half-yearly statement shows that we made contracts for the enlargement of gasholders amounting to £2000, and we tell you now that they will be completed in the course of a month.

Mr. Box: You repeated to-day what you said last half-year, that there would be no considerable outlay in future for those gasholders. I had the pleasure of going over the works, and was much pleased with the plant; but I think the company might pay 5 per cent., and still have sufficient capital to go to market with. I should be the last to propose an increase of dividend if I thought we could not afford it. I objected a few years ago to an increase of even one-half per cent. dividend, when it was 4 per cent. I objected to the increase, because we would feel the bad effects of it afterwards. But now, taking all circumstances into consideration, I think we might pay 5 per cent.

A Director: We cannot spare the money. We must have a working capital.

The Chairman: Nothing could be worse than to have a fluctuating dividend. If we declared 5 per cent. now, the next half-year we should have, perhaps, to come down to 4 per cent. If we go on progressively, step by step, and see our way next half-year to 4½ per cent., we shall be the first to recommend it.

Mr. Van de Wall: Do you move an amendment, Mr. Box?

Mr. Box: No, I make no proposition.

The resolution was then agreed to unanimously.

The Chairman: I have now a pleasing duty to perform, and that is, to speak in favour of our excellent secretary, who has been with us four year; and the question that I have to submit is one entirely for the consideration of the shareholders, who possess the power under the company's act of electing the secretary, discharging him, and settling the amount of his salary. All other officers are under the control of the directors. The secretary has had heavy duties to perform during the last year, and in the performance of them he has displayed an amount of energy and intelligence which called for the applause of the board, and they unanimously recommend that the secretary's salary should be raised to £400 a year. This was the same amount which his predecessor had received. Their present secretary had only received £300 a year, so that there had been a saving of £100 a year upon his salary since he was engaged. There had also been a saving of £240 a year effected on the salaries of the other officers. The directors hoped that the shareholders would be unanimously in favour of the resolution.

Sir James Duke said, he felt great pleasure in proposing the motion, and he did so on the ground put forward by the chairman, that it was peculiarly the province of the shareholders to express their opinion with respect to the amount of salary to which the secretary was entitled. The chairman had not stated the time at which the increase of salary was to commence. He (Sir James Duke) would suggest that the increase should commence with the beginning of the present year. (Cheers.) He cordially approved of the proposition of the chairman, and hoped that the shareholders would have no objection to the increased salary commencing from Jan. 1 last. (Hear, hear.)

Mr. Box could not allow this motion to pass without saying a word or two upon it. He cordially agreed with the observations of the chairman, and would support the resolution. He fully approved of the introductory remarks of the chairman, that the secretary should be chosen by the body of proprietors, and not by the board. The chairman, to be consistent with his own suggestion, ought not to have proposed the resolution. He should have left it to some of the proprietors.

The Chairman: I have not moved the resolution; I merely suggested it.

Sir James Duke: I moved it.

Mr. Box: I think that if this resolution had been moved at the last half-yearly meeting, I should have supported it. I think the secretary is a most efficient man, and that the proprietors are greatly indebted to him for his activity, energy, and perseverance. I know, from the state of the company formerly, that we never had such a secretary; and, seeing that with his assistance we are prospering, and that his salary is only £300 a year, I think we should show that we appreciate his services by unanimously carrying this resolution, which I beg leave to second. (Cheers.)

The resolution was then put from the chair, and carried *nem. dis.*

Mr. Andrews, the secretary, thanked the proprietors most sincerely, not only for the increase in his salary, but for what he valued much more—the kind manner in which they appreciated his services. He could not express his feelings, but he would do everything in his power to promote the interest of the society, and also to uphold its character. (Cheers.)

A vote of thanks was then unanimously awarded to the chairman, the board of directors, and auditors, for their continued and valuable exertions on behalf of the society.

The Chairman, on behalf of himself and board, and Mr. Watt, on behalf of the auditors, severally returned thanks, and the proceedings terminated.

DR. LETHEBY'S ELEVENTH REPORT ON THE GAS OF THE GREAT CENTRAL COMPANY.

TO THE HON. COMMISSIONERS OF SEWERS OF THE CITY OF LONDON.

"Gentlemen,—I have the honour to lay before you my third quarterly report for the current year on the illuminating power and chemical quality of the gas supplied to the City of London by the Great Central Company.

"During the last quarter, the average illuminating power of the gas has been equal to that of 13·32 sperm candles of 120 grains hourly consumption, or to that of 15·25 standard wax candles of the act of Parliament quality.

"In obtaining these results, I have consumed the gas in accordance with the directions of the act, and it gives me pleasure to report that the illuminating power of the gas is still considerably above that mentioned in the company's act, for it amounts in the present instance to just 27 per cent. over the standard quality.

"The chemical quality of the gas has also been remarkably good. In one respect, namely, in a total absence of sulphuretted hydrogen, it has shown a degree of purity which is rarely witnessed. This will be manifest from what follows. A glass tube, containing a strip of paper partly charged with sugar of lead, has been traversed by the gas day and night for a period of three months, and yet the paper has not exhibited the slightest tint of discolouration. I regard this as one of the most severe tests to which the gas could be submitted. The gas has likewise been remarkably free from ammonia and its usual fœtid accompaniments.—I have the honour to remain, gentlemen,

"Your obedient servant,

(Signed) "Henry Letheby, M. B.

"Professor of Chemistry in the College of the London Hospital.

"*London Hospital, Nov.* 10, 1854."

PROFESSOR CRACE CALVERT ON THE PRODUCTS OBTAINED FROM COAL.

At the second Ordinary Meeting of the present session of the Society of Arts, held at the Institution in John-street, Adelphi, on the 22nd ult., Professor F. Crace Calvert, of Manchester, read a paper on the "Manufacture and Application of various Products obtained from Coal (Coal Gas excepted)." Mr. Calvert divided coal into three distinct classes: the first class being employed as fuel in generating steam; the second for making coke; and the third kind for producing gas. With regard to the first, he merely adverted to Sir H. de la Beche and Dr. Playfair's experiments as to the best kind of coal for steam purposes, and the important results obtained in the steam navy, remarking that great improvements were yet to be made in the construction of apparatus for generating steam and economising the fuel. He then referred to the manufacture of coke. The best coals for making coke were those which would yield from 60 to 75 per cent. of coke, with but a slight trace of sulphur, and which had the property of caking or melting together, so as to form a solid mass in the oven. This superior quality of coal was found near Newcastle-upon-Tyne, and in Lancashire, the best coke being made from what was called "Mountain Mine." These superior cokes were characterised by their high density, the brilliancy of their appearance, and the superior power of generating steam. The third class of coals—namely, those employed principally for making gas—were remarkable for yielding, in addition to about 30 per cent. of inferior coke and a large quantity of gas, numerous other products of greater or less value. Amongst these were—Gases: Bicarburetted hydrogen, propyline, light carburetted hydrogen, hydrogen, oxide of carbon, sulphuretted hydrogen; liquids: bisulphuret of carbon, ammonia, eupion, paraffine ore, analine, lencole, carbolic acid, benzine, napthine, napthole; and solids: naphthaleine, para naphthaleine, paraffine, pyrene, chrysene. Passing over the gaseous, and dealing with the liquid, products, which were of two kinds, aqueous and tarry, he spoke of the value of ammonia, as sulphate of ammonia in agriculture, sal ammonia for soldering and dying—as hartshorn (derived from these two salts) in pharmacy—and as ammoniacal alum used also in dying, and which might be manufactured from the shale and other refuse of the coal-pit. A great boon, he observed, would be conferred upon agriculturists if the ammonia, which was produced when coke was made

in common ovens, were saved, as recommended by Dr. Lyon Playfair, who estimated that every 100 tons of coal would yield about 6 tons of sulphate of ammonia. The quantity of coke made annually in England amounted to about 1,000,000 tons, yielding 60,000 tons of sulphate of ammonia, which might be made a cheap and valuable agent in agriculture. From the tarry liquid, coal naphtha, a light oil, composed principally of carbolic acid and pitch. Amongst the useful purposes to which the latter product was applicable, he instanced street-paving. In Manchester, he said, there were streets paved with a mixture of pitch, tar, and asphaltum, spread (while hot) over pebbles and stones, and which formed solid roadways. Some of the streets exposed to the greatest amount of traffic had been paved in this way five or six years, and had never required any repairing since. One great advantage which he attributed to this mode of paving streets was, that it was impervious to water, and prevented refuse matter being washed down under the pavement, and then decaying, the exhalations arising from which he believed had, in many instances, especially on the continent, been the main cause of the outbreak of cholera. From the distillation of tar, naphtha and camphine were obtained, amongst the uses of which he enumerated the waterproofing of cloth and dissolving resins for making cheap varnishes. Of rectified naphtha, benzine was manufactured, which had the property of removing grease, tar, and other impurities from fabrics, of brightening velvets, and was made available in some manufactures as a substitute for alcohol. Converted by means of nitric acid into nitric benzine, it was used instead of essence of bitter almonds for flavouring dishes and scenting perfumery and soaps. From the light oils of tar, tar creosote, a powerful antiseptic, was obtainable. Carboagatic acid, prepared from this substance, was useful to the dyer for producing yellow and green dyes, and in medicine as a febrifuge, for which it had been employed successfully in the Manchester Infirmary. It might be produced at 3s. 6d. a pound, and would, he believed, answer all the purposes of sulphate of quinine, which was 12s. an ounce. The heavy oils combined with the light oils had recently been used with success for the preservation of timber from rot. The aniline obtained from the heavy oil of tar, combined with other agents, produced a beautiful blue colour; and he believed it probable that, in time these products of our coal fields might serve all the purposes to the dyer of indigo and madder. Paraffine oil was another product to which he adverted, and which, he said, when mixed with other oils, was used extensively as a lubricating agent in the cotton mills of Manchester. Solid paraffine was also obtained in the distillation of peat, and was employed for manufacturing candles, there being added to it about 20 per cent. of wax. These candles were remarkable for their transparency, and the pureness of their flame. Mr. Calvert, who was warmly applauded throughout, exhibited specimens of the various chemical products he had described, and, as far as possible, exhibited their effects; and he strongly urged a more extensive inculcation of chemical knowledge in the education of the people.

At the conclusion of the lecture the thanks of the meeting were unanimously accorded to the professor.

Ventilation of Sewers by Gas.—Mr. James Sharp, of Southampton, has addressed a communication to the *Builder*, suggesting the ventilation of sewers by means of cast iron shafts, fixed in convenient situations, in the base of which a mixture of coal gas and atmospheric air, drawn from the sewer, is to be burnt through a wire gauze, to prevent explosion, on the principle of the Davy lamp. The heat produced, will necessarily cause a rapid current up the shaft, which is covered with a cowl to protect the opening from the effect of gusts of wind, which might otherwise check the egress of the air from the shaft. The plan is about to be tried by the inventor at Southampton.

A Scene on Newcastle Quay.—It is a pretty well-known fact that in few towns in the kingdom does there prevail a stronger feeling of the justice of the present war with Russia, or a more high-spirited sympathy with our countrymen in arms in the Crimea, than in Newcastle-on-Tyne. All classes, from the highest to the lowest, feel proud and jealous of the national character, and the county of Northumberland has contributed a considerable contingent of officers and men to our army and navy during the war. Every morning, immediately after the publication of the *Times*, an abstract of the latest intelligence is telegraphed down to Newcastle, and posted in the Central Exchange and Sandhill News-rooms. The Quay-side merchants frequent the latter, and, it appears, have been a good deal annoyed by the obtrusive conduct of one of their number, a Mr. Wm. Thompson, a broker, and an agent for one of the Austrian insurance companies, who, like the Greeks at Manchester, has not disguised his satisfaction on the arrival of intelligence adverse to the wishes of Englishmen. Lately great indignation was created upon the members ascertaining that some one had underscored with red ink those portions of the intelligence received by the morning's express unfavourable to the English and French arms. This audacious insult to the feelings of the members was traced to the person in question, and the case was immediately represented to the committee of management, who called a general meeting of the members to deal with it. A large number of merchants attended, and the delinquent appeared to defend himself. After hearing his explanations, he was required to retire while the members deliberated on his conduct. It appears that he refused to do so, when a lane was made, down which he had to run the gauntlet amid hisses and laughter. He was balloted out, and his name was ordered to be struck out of the books. It appears that he is also a member of the other news-room, and a requisition is being signed to hold a meeting of the members to eject him from it also.

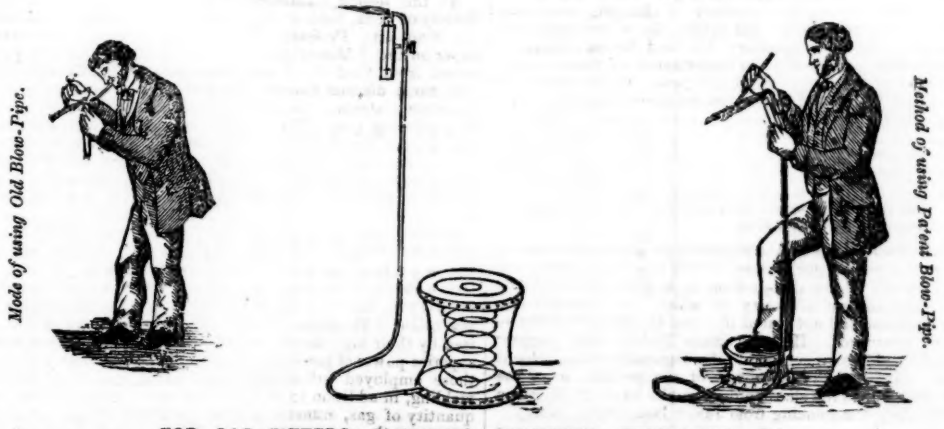
The Ironfoundry Trade of Glasgow.—The means of turning out castings of every description, in this City, have been greatly increased during the last two years, as nine new ironfoundries have been built during that time, and only four taken down. The number of foundries now in good repair and full working order in Glasgow are 51, and in the West of Scotland also 51; in all 102. The quantity of castings which these foundries can turn out annually are immense, particularly for railways, water and gas works, buildings, and bridges.

Advertisements.

BY HER MAJESTY'S ROYAL LETTERS PATENT.

DAVIS'S PORTABLE ATMOSPHERIC BLOW-PIPE,

MANUFACTURED BY DAVIS AND SON, 12, WALCOT STREET, BATH.



FOR GAS FITTERS, PLUMBERS, DENTISTS, JEWELLERS, &C.

Messrs. DAVIS and SON, in calling the attention of the Operatives of the above callings and the Public, would state the advantages of their PATENT BLOW-PIPE over the common one used with the mouth.

1. The labour of the Lungs is entirely superseded. Those accustomed to blow joints in Pipe of large dimensions, or other things requiring a long blast, find it requires a great effort of the lungs to produce the required heat. With the PATENT BLOW-PIPE, the lungs not being employed, joints of large and small dimensions are blown with equal ease.

2. The Blast is more vehement. It is well known that full half the Oxygen is consumed by being inhaled in the Lungs. The Patent employs a pure atmospheric air, containing all the Oxygen, by which a more intense heat is produced, and, consequently, a saving of time in performing the work.

3. It can be used in difficult places, under floors, in close corners, &c., where it would be either difficult or impossible to get the head to use the common Blow-Pipe.

4. In Plumbers' Work all joints that can be made perpendicularly may be blown by it with less than one-tenth the solder and one-third the time.

5. It is more cleanly. The fingers do not come in contact with any grease, as in using dipped rushes, &c., by which the paint and paper of rooms are frequently soiled; and also the burnt tops of rushes being blown about is prevented.

Messrs. DAVIS and SON feel confident a single trial will convince of its great utility and superiority over the old Blow-Pipe.

Retail Price—Complete in Case, 20s.; Superior Bellows, 22s.

Share List.

(Directors and Managers of Gas Works are earnestly requested to enable us to rectify the errors and fill up any omissions in the following List.)

The Companies whose names are printed in italic type are incorporated by Act of Parliament.

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£	**ENGLAND.**	£ s. d	£ s. d	£ s. d
		Aberdare			
		Abergele			
		Aberystwith			
		Abingdon			
1050	10	*Accrington*	10 0 0	7 0 0	15 10 0
		Albrighton			
		Alcester			
		Alford			
		Alfreton			
		Alnwick			
		Alston Moor			
250	10	Alton	10 0 0	5 0 0	10 0 0
800	5	Altrincham	5 0 0	6 0 0	6 0 0
170	10	Ampthill	10 0 0	5 0 0	10 0 0
350	10	Andover	10 0 0	5 0 0	11 0 0
330	5	Appleby	5 0 0	3 0 0	2¼ to 2½
		Arundel			
		Ashbourn, Derby			
292	5	Ashburton	5 0 0	5 0 0	
		Ashby-de-la-Zouch			
		Ashford, Kent			
1600	30	*Ashton-under-Lyne*	30 0 0	10 0 0	60 0 0
		Atherstone			
		Axminster			
200	20	Aylesbury	20 0 0	5 0 0	21 0 0
		Aylsham, Norfolk			
		Bacup, Lancashire			
		Bakewell			
200	10	Baldock	10 0 0	5 0 0	10 0 0
1000	10	Banbury	10 0 0	5 0 0	10 10 0
		Bangor			
500	5	Barking, Essex	5 0 0	5 0 0	5 5 0
260	10	Barnard Castle	10 0 0	5 10 0	10 15 0
		Barnsley £6000		7 10 0	
100	20	Barnstaple	20 0 0	5 0 0	23 0 0
1158	2	Barton-on-Humber	2 0 0	5 0 0	2 0 0
120	25	Basingstoke	25 0 0	7 0 0	35 0 0
2500	20	*Bath*	16 0 0	10 0 0	30 to 32
		Battle £2000		6 0 0	
56	26½	Bawtry	26 10 0	5 0 0	25 0 0
		Beccles (& Water)			
300	30	Bedford	25 0 0	4 0 0	20 0 0
200	10	Bedworth	10 0 0	5 0 0	11 0 0
		Belford			
		Bedale, Yorkshire			
		Belper			
		Beminster			
420	5	Berkhempstead	5 0 0	6 0 0	6 0 0
700	10	Berwick-on-Tweed	10 0 0	6 0 0	12 0 0
		Bewdley			
280	10	Bideford	10 0 0	6 0 0	10 10 0
		Biggleswade			
170	10	Bicester	10 0 0	6 0 0	11 5 0
		Bilston £15,100	5 0 0	7 0 0	6 10 0
		Billericay			
		Bingham			
		Bingley £7400		4 0 0	
		Birkenhead £70,000	35 0 0	3 0 0	35 to 37
2400	50	*Birm. & Staffordsh.*	50 0 0	10 0 0	99½ to 100½
2400	25	*Ditto*, new shares	10 0 0	10 0 0	15 to 16
928	75	*Birmingham*	75 0 0	10 0 0	158 to 160
		do. 1-10 shares			15 to 16
		Bishop's Auckland			
140	25	Bishop's Stortford	25 0 0	5 0 0	24 0 0
3000	15	*Blackburn*	15 0 0	10 0 0	25 0 0
		Blandford			
		Blyth			
		Bodmin			
		Bognor			
3909	16¼	*Bolton*	16 10 0	9 19 5	39 0 0
		Boroughbridge			
160	50	*Boston*	50 0 0	10 0 0	75 0 0
200	10	Bourn	10 0 0	5 0 0	10 0 0
160	10	Brackley	10 0 0		
		Bradford, Wilts			
	25	*Bradford, Yorksh.* £45,000	25 0 0	10 0 0	49 0 0
		Bramptn, Cumblnd			
		Brandon, Suffolk			
		Brecon			
		Bridge-end, Glam.			
6000	5	*Brierly Hill*	5 0 0	4 0 0	5 2 6
		Brighouse			
2350	20	*Brighton*	20 0 0	5 0 0	15 to 16
1125	20	„ new shares	16 0 0	5 0 0	10 to 12
2471	20	*Brighton and Hove*	20 0 0	3 10 0	
107	8	„ new shares			
179800	Stk.	*Bristol United*	Stock	8 0 0	170 to 175
154	8	Brixham	8 0 0	5 0 0	5 to 6
		Braintree			
750	50	*Brentford*	50 0 0	5 10 0	48 to 50
800	25	„ new shares	11 0 0	5 10 0	11 0 0
		Brentwood			
200	30	*Bridgwater*	30 0 0	5 0 0	30 0 0
400	10	Bridlington	10 0 0	5 0 0	10 0 0
		Bridport			
		Brigg			
		Broadstairs			
		Bromsgrove			
		Bromley (Kent)			
		Broughton			
120	10	Bruton	10 0 0	4 0 0	8 0 0
		Brynmawr			
100	25	Buckingham	25 0 0	6 0 0	28 0 0
600	12	*Burnley*	12 0 0	10 0 0	
		Burslem&Tunstall			
		Burton-on-Trent			
		Bury, Lanc. £6570			
		Bury St. Edmund's		5 0 0	
200	10	Buxton	10 0 0		
		Callington			
		Calne, Wilts			
		Camborne			
	50	*Cambridge* £34,560	50 0 0	7 0 0	76 0 0
240	50	*Canterbury*	50 0 0	6 0 0	61 to 63
240	25	*Ditto*, second issue	25 0 0	6 0 0	30 to 31
800	25	*Cardiff*	25 0 0	7 10 0	34 0 0
		Carmarthen			
		Castle Cary			
249	5	Castleford	5 0 0	5 0 0	5 0 0
300	5	Castletown (Man)	2 0 0		
		Chapel on the Frith			
		Chard			
		Chatteris			
255	10	Cheadle	10 0 0	5 0 0	10 0 0
200	50	Chelmsford	50 0 0	5 0 0	84 0 0
		Cheltenham £13,733		9 0 0	
		Chepstow			
230	10	Chesham, Bucks	10 0 0	5 0 0	10 0 0
		Chester			
250	5	Chester-le-Street	5 0 0	6 0 0	5 0 0
		Chesterfield £13,125		4 17 6	
	25	Chichester	25 0 0	6 0 0	30 0 0
		Chippenham			
		Chipping Norton			
		Chorley			
		Christchurch			
		Cirencester			
		Clare (Suffolk)			
		Cleckheaton, York.			
		Clitheroe			
750	4	Cockermouth	4 0 0	7 0 0	5 0 0
		Colchester			
		Collumpton			
		Colne, Lancashire			
		Coleford, Gloucest.			
300	5	Coggeshall	5 0 0	3 0 0	3 0 0
200	25	*Congleton*	25 0 0	5 0 0	31 0 0
		Conway			
		Cowbridge			
		Corsham			
800	25	*Coventry*	25 0 0	6 0 0	30 0 0
		Cowes			
300	5	Crowland			
		Croydon £.0,000		5 0 0	
		Cranbrook £1900		5 0 0	
		Crayford & Bexley			
420	5	Crediton	5 0 0	5 0 0	6 0 0
		Crewe, Cheshire			
		Dalton			
		Darlaston			
		Darlington&Water			
250	20	Dartford	20 0 0	7 10 0	27 0 0
125	20	Daventry	20 0 0	6 0 0	24 8 0
		Dawley, Salop			
346	5	Dawish	5 0 0	8 0 0	7 10 0
		Deal			
		Dedington			
500	6	Denbigh	6 0 0	5 0 0	6 0 0
820	10	*Deptford*	10 0 0		1 to 2
	25	*Derby*	25 0 0	10 0 0	50 0 0
90	20	Dereham (East)	20 0 0	5 0 0	21 0 0
4000	5	*Dewsbury*	5 0 0	7 0 0	8 12 6
		Devizes			
7000	5	*Devonport*	5 0 0	6 0 0	7 10 0
280	25	Dorchester	25 0 0	5 0 0	30 0 0
120	25	Dorking	24 0 0	5 0 0	25 0 0
192	25	Douglas, Isle of Man	25 0 0	8 0 0	30 0 0
	55½	*Dover*	56 10 0	5 15 0	71 to 72
25	60	Downham	60 0 0	7 10 0	
		D iffield			
		Droitwich			
600	20	*Dudley*	20 0 0	5 0 0	28 to 30
		Droylsden			
		Dukinfield			
		Dunmow			
250	10	Dunstable	10 0 0	5 0 0	8 0 0
		Durham			
276	9	Dursley, Gloster	9 0 0	5 10 0	8 0 0
200	10	Eastbourne			
		East Grinstead			
		Egremont, Cumbld			
703	6½	Elland	6 10 0	8 0 0	10 0 0
		Ellesmere			
200	10	Emsworth			
400	5	Enfield	5 0 0	5 0 0	5 0 0
300	19	Epsom and Ewell	19 0 0		
		Eton			
		Evesham			
1600	25	*Exeter*	25 0 0	8 0 0	40 to 42
		Exmouth			
		Eye, Suffolk			
150	10	Fairford	10 0 0		
61	25	Fakenham	25 0 0	5 0 0	25 0 0
		Falmouth			
100	30	Fareham	30 0 0	2 10 0	30 0 0
120	25	Farnham	25 0 0	10 0 0	42 0 0
		Farringdon			
		Faversham			
	5	Filey	5 0 0	5 0 0	5 0 0
		Fleetwood			
300	10	Folkestone	10 0 0	10 0 0	15 0 0
240	10	„ new shares	8 0 0	10 0 0	13 0 0
		Fowey			
		Fordingbridge			
240	5	Framlingham	5 0 0	5 0 0	5 10 0
		Frome			
		Gillingham, Dorset			
		Glastonbury			
		Glossop £10,000		9 0 0	
1000	25	*Gloucester*	25 0 0	7 10 0	28 0 0
516	5	Gomersal	5 0 0		
		Godalming			
350	10	Gorleston & South-down	2 10 0		2 10 0
		Gosport			
450	20	Grantham	20 0 0	7 0 0	28 0 0
1000	20	Gravesend	20 0 0	5 0 0	21 0 0
		Grays (Essex)			
1000	10	*Great Grimsby*	9 10 0	8 0 0	13 to 14
		Great Torrington			
	25	Guildford	25 0 0	4 0 0	20 0 0
		Guisborough			
		Hadleigh			
		Hailsham			
		Hales Owen			
360	5	Halesworth	5 0 0	7 10 0	5 10 0
600	25	*Halifax*	25 0 0	10 0 0	48 0 0
		Halstead			
		Hampton Court			
1000	10	*Harrogate*	6 5 0	5 0 0	6 5 0
	5	*Hartlepool* £15,137	5 0 0	7 10 0	7 12 6
540	6	Haslingden, Lancsh	6 0 0	7 10 0	6 0 0
339	50	*Hastings and St. L.*	50 0 0	6 0 0	60 0 0
500	5	Havant			
		Haverhill			
		Haworth, Yorks			
		Hayle			
4935	1	Hebden Bridge	12 6		15 0
		Helstone			
250	10	Hemel Hempstead	10 0 0	4 0 0	6 10 0
300	10	Henley-on-Thams.	10 0 0		
		Hereford £5300		4 0 0	
300	10	Herne Bay	10 0 0	6 0 0	11 0 0
270	10	Hexham	10 0 0	7 0 0	12 0 0
400	25	*Heywood*		7 10 0	
520	5	High Wycombe	5 0 0	6 0 0	6 15 0
		Highworth (Wilts)			
280	10	Hinckley	10 0 0	5 0 0	9 0 0
		Hindley, Lancash.			
200	20	Hitchen	20 0 0	5 0 0	20 0 0
100	10	Hythe & Sandgate	10 0 0	6 0 0	11 0 0
		Hoddesden			
		Holbeach			
		Holmfirth £8880		3 10 0	
		Holyhead			
		Holywell (see Brit. Provincial			
95	25	Honiton	25 0 0	4 0 0	17 0 0
		Horbury			
6	500	Horncastle	500		
1200	2	Horsforth	2 10 0		2 10 0
128	20	Horsham	20 0 0	5 0 0	
	10	Houghton-le-Sprg.	10 0 0	8 0 0	
		Howden			
		Hull, Sculcoats (see Brit. Provincial)			
		Hull, £11,712. 10s.		5 0 0	
210	10	Hungerford	10 0 0	5 0 0	10 0 0
		Huddersfield			
		Hyde (Cheshire)			
		Idle and Eccleshill			
400	6½	Ilkeston	6 5 0	3 10 0	6 5 0
		Ilminster			
		Ilford			
		Ilfracombe			
		Ironbridge			
1400	10	*Ipswich*	10 0 0	8 0 0	15 0 0
1100	10	„ new shares	7 10 0	8 0 0	12 10 0
800	25	*Isle of Thanet*	20 0 0	5 0 0	20 to 21
		Kendal £9100		8 15 0	
300	10	Kenilworth	7 10 0		7 10 0
400	5	Keswick	5 0 0	4 5 0	4 4 0
100	25	Kettering	25 0 0	5 0 0	25 0 0
		Kiddermins. £10000		5 0 0	
		Kimbolton			
		King's Langley			
		Kingston-on-Thms			
		Kington, Hereford			
		Kirkby Lonsdale			
		Kirkham, Lanc.			
		Knighton			
		Knutsford			
		Lancaster			
		Llanelly £3000		5 0 0	
		Llandovery			
		Leamington Priors £22,500		6 0 0	
160	10	Leatherhead	10 0 0		
		Ledbury			
		Leeds Old Comp.			
	25	old stk., £60,300	25 0 0	10 0 0	46 to 47
	25	new „ £23,775	25 0 0	6 0 0	29 to 30
	20	*Leeds New* £60,000	20 0 0	10 0 0	36 to 38
3623	10	*Leicester*	10 0 0	7 0 0	15½ to 16½
		Leigh (Lancashire)			
135	20	Leighton Buzzard	20 0 0	7 0 0	21 0 0
400	10	Leominster	9 0 0	5 0 0	8 0 0
		Leyburn, Yorksh.			
240	5	Liskeard	5 0 0	8 0 0	6 0 0
330	25	Lewes	25 0 0	5 0 0	25 0 0
320	25	*Lincoln*	25 0 0	10 0 0	48 0 0
		Leyland, Lancash.			
240	5	Littlehampton	5 0 0	7 10 0	5 0 0
250	20	Lichfield	20 0 0	10 0 0	35 0 0
		Liverpool United	100 0 0	10 0 0	188 to 190
		„ ¼ sh.	25 0 0	10 0 0	47¼ to 47¾
50	25	Langport	25 0 0	4 0 0	15 0 0
		London Comps.—			
5000	10	Anglo-Romano	10 0 0		
5000	20	British Provincial (Holywell, Hull, Norwich, Potteries, Trowbridge)	20 0 0	7 0 0	20 to 21
	20	„ Prov., new	16 0 0	7 0 0	17 to 18
4000	25	*Commercial*	25 0 0	6 0 0	25 to 26
2000	25	„ new shares	2 10 0	6 0 0	par to 1pm
		„ deb. £12,000			
12,000	50	*Chartered*	50 0 0	4 0 0	37 to 38
6000	50	„ new shares	10 0 0	4 0 0	7 to 7½
2000	150	*City of London*	150 0 0	3 0 0	100 to 105
4000	50	*Equitable*	50 0 0	4 0 0	28 to 29
		„ deb. £47,600			
12,000	20	European—(Amiens, Boulogne, Caen, Havre, Nantes, & Rouen)	20 0 0	5 & bonus	14 to 15
15,000	10	*Gt. Cntl. Consumers* deb. £66,000	10 0 0	8 0 0	11 to 11¼

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
8000	50	*Impl. Continental* —First capital (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam).....	42 0 0	6 11 0	40 to 45
7000	50	Second capital—(Aix la Chapelle, Antwerp, Bordeaux, Brussels, Cologne, Frankfort-on-Maine, Haarlem, Marseilles, Toulouse Vienna)	41 0 0	10 7 0	68 to 70
	50	Third capital ...	13 10 0	9 4 0	67 to 69
13,000	50	*Imperial*	50 0 0	9 0 0	92 to 95
4000	40	*Independent*	40 0 0	6 0 0	46 to 47
5000	50	*London*	50 0 0		5 0 0
1000	50	„ (red)	50 0 0		
2000	50	„ (blue).....	50 0 0	3 6 0	15 to 18
6000	25	„ (preference)	25 0 0	6 0 0	25 to 26
50,000	1	Oriental (Calcutta)	1 0 0		¾ to ⅞
9000	50	*Phœnix*	19 0 0	4 0 0	28 to 29
1000	100	*Ratcliff*	90 0 0	5 0 0	70 to 72
4000	25	*South Metrop.*	25 0 0	5 0 0	21 to 23
7000	10	*Surrey Consumers'*	10 0 0	8 0 0	11 0 0
9000	50	United Genl. (Cork, Dublin, Limerick)	50 0 0	2 0 0	19 to 20
6410	20	Western A shares	20 0 0	3 0 0	13 to 14
3500	20	„ B „	11 0 0	3 0 0	3 0 0
		Littleborough			
		Lostwithiel			
		Loughborough.....			
240	25	*Louth*.....	25 0 0	6 0 0	26 10 0
2500	10	*Lowestoft (& Water)*			
		Llangollen			
611	5	Ludlow Union.....	5 0 0	5 0 0	5 0 0
		Luton.....			
		Lutterworth.....			
63	20	Lyme Regis	20 0 0	4 0 0	20 0 0
120	25	Lymington	25 0 0	5 0 0	25 0 0
200	10	Malmesbury.....	10 0 0	2 10 0	5 15 0
		Macclesfield 32,000£			
		Maidenhead.....			
300	50	*Maidstone*.....	50 0 0	10 0 0	90 0 0
160	40	Maldon	33 0 0	5 10 0	24 0 0
		Marlborough			
		Malton (New).....			
		Manningtree			
		Mansfield £5000		10 0 0	
150	10	Mansfield Wood-March .....[house	10 0 0		
		Margate(see List of T.			
		Market Deeping ...			
		Market Drayton ...			
132	25	Market Harboro'	25 0 0	6 0 0	31 0 0
		Market Raisin.....			
		Market Weighton			
210	10	Marlow	10 0 0	5 0 0	10 0 0
370	10	Maryport	10 0 0	6 0 0	12 0 0
500	5	Matlock Baths.....	5 0 0		
		Melksham.....			
		Melton Mowbray .			
		Merthyr Tydvil ...			
50	10	Mere	10 0 0		
		Middleton £9039		5 0 0	
		MidsummerNorton			
		Middlesboro'			
198	5	Mildenhall	5 0 0	5 0 0	5 0 0
700	10	Millcham	10 0 0	10 0 0	14 10 0
650	5	Mold (and Water)	5 0 0	6 0 0	6 10 0
700	10	Monmouth	10 0 0	5 0 0	
		Monk Wearmouth			
150	10	Moreton in Marsh	10 0 0	3 10 0	
		Morley (nr. Leeds)			
		Mossley.....			
		Mottram			
220	16	Morpeth	16 0 0	5 0 0	17 10 0
		Nantwich			
		Neath.....			
183	10	Needham Market..	10 0 0	4 0 0	
		Newark..... £5000		10 0 0	
250	20	Newbury...[Union	20 0 0	5 0 0	20 0 0
13,000	5	Newcastle&Gatshd	5 0 0	8 0 0	7 12 6
		Newcastle-under-Lyne £6200		4 0 0	
600	5	Newmarket	5 0 0	6 0 0	5 0 0
250	5	Newent	5 0 0		
		New Mills £2115		8 0 0	
		Newport, M. £11720			
320	50	*Newport, Isle of W.*	38 0 0		5 0 0
		Newport Pagnell			
		Newport, Salop ...			
		New Romney			
		Newton Abbot.....			
		Newton, Lanc.....			
		Newtown(Mntgom.			
		Northallerton			
120	10½	North Walsham ...	10 10 0	5 0 0	10 10 0
542	20	*Northampton*	18 0 0	10 0 0	31 0 0
		Northwich			
		Norwich (see British Pro. £40,000		7 0 0	
900	50	*Nottingham*	50 0 0	10 0 0	
900	50	New shares		10 0 0	
		Nuneaton			
170	10	Oakham.....	10 0 0	4 10 0	8 10 0
		Oakhampton			
200	10	Odiham, Hants....	10 0 0	4 0 0	10 0 0
		Olney			
100	10	Ongar.....	10 0 0	2 10 0	5 0 0
658	10	*Ormskirk*	7 10 0	5 0 0	
		Otley, Yorkshire...			
80	25	Oundle	25 0 0	7 0 0	25 0 0
120	150	*Oxford*	150 0 0	6 10 0	230 0 0
		Over Darwen £8000		5 0 0	
		Padiham			
		Padstow.....			
		Pately Bridge, Yrk.			
		Peeltown (Man) ...			
		Pembroke.....			
250	20	Penrith	15 0 0	6 10 0	21 0 0
		Penryn			
		Penzance			
10		Petworth	10 0 0	9 10 0	14 15 0
330	5	Petersfield	5 0 0	4 0 0	5 0 0
		Pickering			
3000	10	*Plymouth*	10 0 0	8 0 0	18 0 0
		Pocklington.....			
		Pontefract.....			
		Pontypridd		4 0 0	
400	10	Poole	10 0 0	5 0 0	10 0 0
		Port Madoc.....			
600	50	*Portsea Island* ...	53 0 0	5 0 0	50 to 51
		Potton (Beds)			
400	10	Prescott.....	9 0 0	4 13 4	7 0 0
3000	20	*Preston*	20 0 0	10 0 0	44 0 0
		Pudsey ...£12,000		5 0 0	
		Pwllheli.....			
		Quordon & Montsrl			
		Radcliff and Pilkington £9000		4 12 10	
		Ramsay, I. of Man			
		Ramsgate(see List of T			
1000	10	*Reading*.....	10 0 0	4 0 0	7½ to 8
500	20	*Reading Union* ...	20 0 0	4 0 0	16 0 0
		Redditch			
		Redruth.....			
		Reigate			
		Retford (East).....			
		Rhyl			
		Richmond(Surrey)			
400	5	Rickmansworth ...	5 0 0		5 0 0
180	10	Ringwood	10 0 0		10 0 0
		Ripon.....			
		Rochester & Chatham		6 0 0	
		Rochford [£20,000			
		Rockingham.....			
		Romford			
		Ross			
245	25	*Rotherham*	25 0 0	6 0 0	38 to 39
	12½	do. Half Shares	12 10 0	6 0 0	19 to 19½
		Royston.....			
		Rugby			
500	10	Rugeley.....	8 10 0	5 0 0	10 10 0
		Runcorn.... £11,000		7 10 0	
		Ruthin			
500	10	Ryde	10 0 0	6 0 0	13 0 0
		Romsey			
		Saddleworth.....			
225	20	Saffron Waldea ...	20 0 0	3 15 0	19 0 0
		St. Alban's			
		St. Austel			
		St. Asaph			
		St. Colomb			
		St. Helen's £520		7 10 0	
		St. Helier's (Jersey)			
		St. Ives, Hunting.			
		St. Ives, Cornwall			
250	10	St. Neot's	10 0 0	8 0 0	12 0 0
		St. Peter's Pt., Guer			
320	25	Salisbury.....[nsey	25 0 0	6 0 0	28 to 30
317	10	Sandbach	10 0 0	5 0 0	12 0 0
140	10	Saxmundham	10 0 0	5 0 0	10 0 0
		Scarborough.....	10 0 0		13 0 0
201	5	Sedburgh	5 0 0	2 10 0	4 15 0
300	16	Selby	16 0 0	5 0 0	16 0 0
		Settle			
290	10	Sevenoaks.....	10 0 0	4 0 0	10 0 0
250	10	Shaftesbury	10 0 0	3 0 0	9 0 0
5400	25	*Sheffield United* ...	24 0 0	7 10 0	29 to 30
		Shelton, Pott.'s.B.P			
		Shepton Mallet ...			
400	5	Sherborne	5 0 0	5 0 0	5 0 0
		Shields (Tynemth.	5 0 0	5 0 0	5 17 6
		Shields (South) ...			
		Shifnal, Salop			
1000	5	*Shipley*	5 0 0	6 0 0	7 10 0
150	10	Shipston-on-Stour	10 0 0	5 0 0	10 0 0
		Shoreham			
		Shrewsbury £10,000		7 0 0	
400	10	Skipton	10 0 0	4 0 0	11 0 0
		Sleaford			
250	10	Slough	10 0 0		
		Snaith			
		Sobam.....			
400	5	Southam	5 0 0		
		Southend, Essex...			
300	5	Southwold [Bdge)	5 0 0	5 0 0	5 0 0
2000	5	South Essex (Lea			
		South Molton			
1000	50	*Southampton*	32 0 0	5 0 0	
220	10	Southwell	10 0 0	4 0 0	
		Sowerby, Yorksh.			
		Spital (Berwick-			
400	5	Spilsby [on Tweed)	5 0 0		
		Staindrop			
		Stretford			
		Stokesly.....			
		Stafford £10,000		5 0 0	
		Staines and Egham			
		Staley Bdg. £15,000		10 0 0	
225	50	*Stamford*	50 0 0	4 0 0	48 0 0
840	9½	*Stockton-on-Tees*	9 10 0	9 0 0	11 to 12
1000	10	Stoke-upon-Trent	10 0 0	7 0 0	12 15 0
500	10	„ new shares	8 0 0	7 0 0	10 10 0
		Stone, Stafford.....			
		Stoney Stratford ...			
		Stourbridge			
		Stowmarket.....			
150	20	Stratford-on-Avon	30 0 0	7 10 0	30 0 0
		Stroud			
169	10	Swaffham.....	10 0 0	5 0 0	5 10 0
		Swansea £9000			
		Sudbury.....			
		Sunderland, old....			
6400	5	*Sunderland*, new .	5 0 0	6 0 0	6 12 6
200	10	Sutton Coldfield ...	10 0 0		
		Sutton (Surrey).....			
250	10	Sutton-in-Ashfield	10 0 0	5 0 0	10 0 0
		Sutton Southcoates & Drypool (Hull).	20 0 0		23 to 24
		Swindon.....			
1000	10	Sydenham.....	10 0 0		
2800	5	*Taunton*.....	5 0 0	6 0 0	6 0 0
		Tadcaster			
		Tamworth.....			
		Tavistock.....			
200	5	Tenbury.....	5 0 0	5 0 0	5 0 0
		Tenby.....			
150	10	Tenterden.....	10 0 0	4 0 0	8 0 0
		Tetbury, Gloster..			
		Tewkesbury			
200	10	Thame	10 0 0	5 0 0	10 0 0
230	10	Thetford	10 0 0	6 0 0	10 10 0
		Thirsk			
		Thornbury.....			
		Thorne			
111	10	Tiverton	10 0 0	10 0 0	17 to 18
1141	5	Todmorden	5 0 0	5 0 0	6 0 6
600	2½	Topsham	2 10 0		3 0 0
		Torquay.....			
		Torrington, Devon			
		Totnes			
		Totnes Consumers			
4000	5	Tottenham	3 15 0	8 0 0	4 0 0
		Towcester.....			
		Town-Malling.....			
225	10	Tring	10 0 0	5 0 0	10 0 0
		Trowbridge (see			
75	50	Truro ...[Brit. P.)	50 0 0	5 0 0	
		Tunbridge.....			
		Tunbridge Wells...			
		Tuxford			
		Ulverston.....			
		Uppingham			
210	5	Upton-on-Severn	5 0 0	5 0 0	5 0 0
		Usk.....			
		Uttoxeter.....			
		Uxbridge			
		Ventnor.....			
1000	25	*Wakefield*, old capl	25 0 0	8 0 0	35 0 0
1600	5	„ new „	5 0 0	8 0 0	7 0 0
		Wallasey.....			
300	10	Wallingford	10 0 0	5 0 0	5 0 0
994	10	Wandsworth.....	10 0 0	5 0 0	11 0 0
200	10	Wantage.....	9 0 0	5 0 0	10 10 0
	24	*Warrington* £25304	20 0 0	10 0 0	28 to 29
100	10	Wareham	10 0 0	3 10 0	8 0 0
		Warkworth			
120	25	Warminster	25 0 0	5 0 0	27 0 0
		Warth			
		Warwick £15,000		6 0 0	
		Watford.....			
111	25	Welchpool, Mntgy.	25 0 0	5 0 0	25 0 0
		Wellingborough ...			
100	24	Wellington, Salop	24 0 0	7 10 0	24 0 0
		Wellington, Somers			
160	25	*Wells, Somst.* £5000	25 0 0	10 0 0	32 to 34
		Westbury.....			
		Weston-sup.-Mare			
2600	5	West Ham	5 0 0	5 0 0	5 0 0
		Wetherby			
		Whitby			
		Whitehaven			
		Whitstable			
250	10	Whittlesea.....	10 0 0	5 0 0	11 0 0
1216	10	*Wigan*	10 0 0	10 0 0	22 0 0
		Willenhall.....			
		Wilton			
111	10	Winslow.....	10 0 0	5 0 0	10 0 0
210	10	Wimborne Minster	10 0 0		
600	10	Wimbledon	8 0 0		8 0 0
		Wincanton.....			
380	50	Winchester	50 0 0	5 0 0	50 0 0
900	12½	Windsor.....	12 10 0	10 0 0	23 0 0
		Witham.....			
		Witney.....			
4480	10	*Wolverhampton* ...	10 0 0	9 0 0	19 to 19½
4480	10	do. new shares	1 5 0	9 0 0	4 5 0
		do. deb. £10,000			
200	10	Woburn.....	10 0 0	5 0 0	10 0 0
210	10	Wokingham.....	10 0 0	4 0 0	10 0 0
12	500	Woodbridge.....	500 0 0	5 0 0	
600	2½	Woodstock	2 10 0		2 15 0
		Wooler			
		Wotton-un.-Edge			
2930	10	*Worcester*	10 0 0	8 0 0	14 5 0
		Workington			
		Worksop & Radford			
200	10	Wirksworth	10 0 0	5 0 0	10 0 0
		Worthing.....			
		Wrexham			
1800	10	Woolwich Equitbl.	10 0 0	5 0 0	10 2 6
		Woolwich Consms.			
		Woolwich (North)			
		Wymondham.....			
795	20	Yarmouth.....	20 0 0	5 0 0	17 to 18
		Yeadon, near Leeds			
140	30	Yeovil	30 0 0	5 0 0	30 0 0
5		*Fork Unta.* £55,000	5 0 0	6 0 0	7 10 0
		SCOTLAND.			
13,000	5	Aberdeen	3 11 0	7 0 0	4 10 0
420	10	Airdrie	10 0 0	7 10 0	12 10 0
		Alloa			
		Annan			
1300	1	Anstruther.....	1 0 0	7 10 0	1 2 0
100	20	Ardrossan	20 0 0	4 0 0	20 0 0
550	20	Arbroath	20 0 0	7 10 0	30 0 0
381	5	Auchterarder.....	5 0 0	7 10 0	7 0 0
750	2	Auchtermuchty	2 0 0	6 0 0	2 10 0
2666	5	Ayr, old	5 0 0	6 0 0	6 0 0
2500	2	Ditto, new.....	2 0 0	6 0 0	2 0 0
250	10	Banff	10 0 0	9 10 0	10 12 6
		Barrhead			
		Bathgate.....			
		Beith.....			
1000	1	Bervie	1 0 0		1 0 0
		Biggar			
739	5	Blairgowrie	5 0 0	8 0 0	7 0 0
400	6	Borrowstowness ...	6 0 0	5 0 0	8 0 0
540	5	Brechin	5 0 0	8 10 0	9 0 0
		Bridge of Allan ...			
2250	2	Broughty Ferry ...	2 0 0	6 0 0	2 2 0
		Burntisland			
		Campbelton			
		Carluke (Lanark)..			
		Claokmannan			

Number of Shares issued.	Amount per Share	Name of Company.	Amount paid up per Share	Dividend per Cent. per Ann.	Price.
	£		£ s. d	£ s. d	£ s. d
1333	3	Coatbridge	3 0 0	10 0 0	4 0 0
		Coldstream			
		Collinsburgh			
		Comrie			
2744	1	Crieff	1 0 0		1 0 0
		Crail, Fife			
600	1	Cullen	1 0 0	5 0 0	15 0
		Cumbernauld			
200	6	Cumnock	6 0 0	5 0 0	6 0 0
600	5	Cupar Angus	5 0 0	7 0 0	7 3 0
250	10	Cupar Fife	10 0 0	7 10 0	15 0 0
		Dalkeith			
750	2	Denny			
		Dingwall			
		Dornoch			
500	1	Douglas	1 0 0	6 0 0	1 1 0
		Dufftown			
		Dumbarton			
400	70	Dumfries	70 0 0	5 0 0	70 0 0
		Dunbar			
560	2½	Dunblane	2 10 0	4 0 0	2 10 0
	23½	*Dundee*, old £23,687	23 15 0	8 8 0	30 10 0
8000	5	*Dundee, new*	5 0 0	4 0 0	4 15 0
860	10	Dunfermline	10 0 0	7 10 0	15 0 0
		Dunkeld			
1000	2	Dunoon	2 0 0		2 0 0
		Dunse			
250	5	Dysart	5 0 0	7 10 0	6 0 0
6000	23	*Edinburgh Gas Co.*	25 0 0	10 0 0	56½ to 57
5480	25	*„ and Leith Co.*	25 0 0	10 0 0	53 0 0
		Elie			
455	11½	Elgin	11 10 0	6 0 0	11 10 0
		Falkirk, old			
		„ new			
		Falkland			
		Ferry Port on Craig			
600	1	Fochabers	1 0 0		1 0 0
1440	5	Forfar	5 0 0	7 10 0	7 19 0
		Fort William			
2000	16s.	Fraserburgh	16 0	5 0 0	16 0
500	5	Galashiels	5 0 0	10 0 0	9 10 6
		Garlieston			
		Gatehouse n. Fleet			
900	2½	Girvan	2 10 0	6 0 0	2 10 0
6000	25	*Glasgow*	25 0 0	10 0 0	54 0 0
15000	10	*Glasg. City & Suburb.*	10 0 0	10 0 0	19 10 0
		Grangemouth			
		Grahamston			
	8½	Haddington	8 10 0	7 10 0	12 10 0
1600	5	*Hamilton*	5 0 0	10 0 0	8 3 0
440	5	Hawick	5 0 0	7 10 0	7 10 0
300	5	Helensburgh	5 0 0	7 10 0	7 10 0
1312	1	Huntly	1 0 0	7 10 0	1 1 0
250	5	Inverary	5 0 0	10 0 0	6 12 6
425	1	Inverkeithing	1 0 0	5 0 0	1 0 0
1200	10	*Invern. Gas & Water*	10 0 0	7 0 0	14 0 0
2400	5	„ new shares	1 5 0	7 0 0	2 0 0
310	10	Irvine	10 0 0	10 0 0	15 0 0
		Jedburgh			
		Johnstone (Paisley)			
		Keith			
		Kelso			
		Kilmarnock			
339	5	Kincardine	5 0 0	2 10 0	4 5 6
		Kinghorn			
		Kingskettle, Fife			
		Kinross			
120	5	Kirkaldy	5 0 0	10 0 0	8 10 0
320	5	Kirkcudbright	5 0 0	5 0 0	5 0 0
1000	3	Kirkintulloch, near	3 0 0	5 0 0	3 0 0
227	5	Kirkwall... [Glasg.	5 0 0	5 0 0	4 10 0
518	5	Kirriemuir	5 0 0	6 0 0	
		Lanark			
		Largo, near Leven			
280	5	Largs	5 0 0	7 10 0	7 to 8
		Lasswade, n. Edin.			
177	5	Lauder	5 0 0	5 0 0	5 0 0
		Leith			
1879	1	Leslie, Fife	1 0 0	7 10 0	1 8 0
614	1	Leswahago	1 0 0	6 0 0	1 0 0
1500	1	Leven	1 0 0	5 0 0	1 2 0
100	10	Linlithgow	10 0 0	7 10 0	15 0 0
		Linton, n. Norfolk			
		Lochee, n. Dundee			
240	5	Lochgilphead	5 0 0	7 10 0	5 5 0
		Lochwinnoch, near			
1200	1	Markinch, [Paisley	1 0 0	7 10 0	1 5 0
282	3	Maxwellhaugh	3 0 0	5 0 0	3 0 0
		Maxwell-town, n.			
423	5	Maybole, Ayrshire	5 0 0	4 10 0	5 0 0
		Maryhill, n. Glasg.			
373	2	Melrose	2 0 0	7 10 0	2 0 0
718	2	Mid & East Calder	2 0 0		2 0 0
200	5	Moffat	5 0 0	5 0 0	5 0 0
400	20	Montrose	20 0 0	10 0 0	35 0 0
		Musselburgh			
618	1	Nairn	1 0 0	5 0 0	1 0 0
		Neilston, n. Glasg.			
1056	1	Newmills, near Kilmarnock	1 0 0	5 0 0	1 0 0
		Newburgh, Fife			
		Newton-on-Ayre			
107	14½	Newton Stewart	14 10 0	5 0 0	14 10 0
		North Berwick, NB			
		North Queensferry			
215	5	Oban	5 0 0	7 10 0	5 0 0
194	5	Peebles	5 0 0	5 0 0	5 0 0
800	25	Perth	25 0 0	4 16 0	22 10 0
	5	„ new	5 0 0	2 10 0	4 2 6
		Peterhead			
		Pittenweem			
2416	1	Polloksnaws, n Glasg	1 0 0	7 10 0	1 5 0
		Port Glasgow			
		Portobello, n. Edin.			
200	5	Prestonpans	5 0 0	6 0 0	5 0 0
1500	1½	Rutherglen, n Glasg	1 6 8	5 0 0	1 6 8
		Renfrew, n. Paisley			
		Saltcoats			
951	1	Sanquhar	1 0 0	5 0 0	1 0 0
		Selkirk			
		South Queensferry			
448	12	St. Andrew's	12 0 0	6 0 0	14 0 0
200	8	Stewarton	8 0 0	5 0 0	8 0 0
7330	2	Stirling	2 0 0	8 0 0	2 12 0
2500	1	Stonehaven	1 0 0	6 5 0	1 6 0
		Stonhouse, Lanrks.			
600	2½	Stornoway	2 10 0		2 15 0
420	5	Stranraer	5 0 0	7 10 0	5 to 5½
601	2	Strathaven, near	2 0 0	8 0 0	2 15 0
643	2½	Thurso... [Hamlin	2 10 0	4 0 0	2 10 0
		Tillicoultry, n. Alloa			
800	1	Tranent	1 0 0	5 0 0	1 0 0
		Troon			
		Wick			
		Wigton... [haven			
2051	1	Wemyss and Buck-	1 0 0	6 0 0	1 2 0
		IRELAND.			
300	10	Armagh	10 0 0	10 0 0	20 0 0
		Ballinasloe			
		Bangor (co. Down)			
700	80	*Belfast*	80 0 0	7 10 0	80 0 0
51	5	Ballymena	5 0 0	10 0 0	
		Ballymoney			
150	5	Ballynahinch	5 0 0		5 0 0
		Carrickfergus			
1100	5	Carlow	5 0 0		4 10 0
400	5	Cavan	5 0 0		5 0 0
		Cork (see Un. Gas.)			
		Cookstown			
1300	5	Clonmel Consumrs	5 0 0	5 0 0	5 0 0
		Drogheda			
19,000	10	*Dublin Consumrs.*	6 0 0	7 0 0	8 10 0
		Dublin Hibernian			
160	25	Dundalk [(see U.G.	25 0 0	5 0 0	25 0 0
200	10	Dungannon	10 0 0	7 10 0	12 10 0
871	5	*Downpatrick*	5 0 0	4 0 0	5 0 0
		Enniskillen			
		Enniscorthy			
240	25	Galway	25 0 0	10 0 0	37 10 0
		Keady			
400	10	Kilkenny	10 0 0	8 0 0	11 5 0
		Killarney			
		Larne			
		Limerick (see U.G.)			
1725	5	Limerick Consum.	5 0 0		
		Lismore			
600	15	Londonderry	15 0 0	6 13 4	21 10 0
		Louth			
500	7	Lisburn	7 0 0	7 10 0	8 5 0
540	10	Lurgan	6 0 0	6 0 0	6 0 0
		Mallow			
		Monaghan			
		Nenagh			
428	5	Newcastowards	5 0 0	6 0 0	6 15 0
		Newcastlimavady			
750	20	Newry	20 0 0	5 0 0	20 0 0
425	5	Omagh	5 0 0		5 0 0
125	20	Portadown	20 0 0	5 0 0	20 0 0
		Portaferry			
600	10	Sligo	10 0 0	2 10 0	7 0 0
		Tralee			
		Waterford			

The Gas Works in the undermentioned towns belong to private individuals:—

Abergavenny.	Chester (Roodee).	Fermoy.	Huntingdon.	Oswestry.	Sheerness.	Ware. (2 works)
Barnet.	Chertsey.	Gainsborough.	Hyde (Cheshire).	Parsonstown.	Sidmouth.	Wem.
Blaydon, n. Newcastle.	Crewkerne.	Goole.	Leiston (Suffolk).	Peterborough.	Sittingbourne.	Wexford.
Bridgenorth.	Dartmouth.	Harleston.	Lynn.	Pontypool.	Spalding.	Weymouth.
Brompton & Gillingham	Eltham.	Hertford.	New Ross.	Rye.	Tipperary.	Whitchurch (Salop).
Bungay.	Ely.	Holt.	Northfleet.	Sandwich.	Waltham Abbey.	Wisbeach.
Carnarvon.	Faraley.	Hunmanby.	Newport I. W. (new).	Seaham Harbour.		

The Gas Works belong to the Corporations, or to Commissioners acting under special acts of Parliament, in the following towns:—

Beverley.	Doncaster.	Keighly.	Manchester.	Richmond (Yorkshire).	Southport (Lanc.)	Trim (Meath).
Blackpool.	Great Malvern.	Knaresborough.	Milton (Kent).	Rochdale.	Stockport	Walsall.
Carlisle.	Greenock.	Leek.	Oldham.	Rothesay.	Strabane.	Wells (Norfolk).
Cashel.	Haverfordwest.	Lytham (Lanc.)	Paisley.	Salford.	Teignmouth.	Youghall.
Coleraine.						

Price Current.

CASTINGS, per Ton.

Average Weight of Cast Iron Gas Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.

	London.	Glasgow	Newcastle.	Wales.	Yorksh., Derbysh., and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 5 0	3 10 0	4 5 0	4 10 0	4 15 0
1¼ and 2 inches Socket Pipes	8 5 0	7 10 0	8 0 0	8 5 0	8 5 0
2½ and 3 do. do.	8 0 0	7 5 0	7 15 0	8 0 0	8 0 0
4 and 5 do. do.	7 15 0	7 0 0	7 10 0	7 15 0	7 15 0
6 inches and upwards do.	..	..	7 5 0	7 7 0	7 10 0
Extra for bends, branches, and connection	2 10 0	2 10 0	2 10 0	2 10 0	2 10 0
Retorts, 2nd fusion, hot blast	7 5 0	6 10 0	7 2 6	7 7 6	7 7 6
Do. 2nd fusion, cold blast	7 10 0	..	7 12 6	7 17 6	7 17 6
Tank Plates, ⅜ thick and above	8 0 0	6 15 0	7 7 6	7 12 6	7 12 6
Do. less than ⅜	7 15 0	7 0 0	7 15 0	8 0 0	8 0 0
Plain Castings ex. models	7 15 0	7 0 0	7 12 6	7 17 6	7 17 6

COALS.

NEWCASTLE.

	s. d.	
Unscreened	7 6	per ton.
Whitwell Primrose		„
Dean's Primrose	8 0	„
Pelton		„
Brancepeth		„
Medomsley		
Pelaw	8 3	„
Burnhope		
Eighton Moor		
Felling Main		
New Pelton		
Peareth	8 6	„
South Pelaw		
Waldridge		
Washington Hutton		
South Peareth		
Ramsay's Cannel	16 0	„
Cowen's Cannel	18 0	„

DERBYSHIRE.

Clay Cross, Deep Main, and New Birchwood	8s. 6d.	per ton.

SCOTCH CANNEL.

Boghead at Leith	27 0	„
Kirkness best	23 0	„
Capeldrae, first quality	20 0	„
Ditto, second quality	12 6	„
Lothian	20 0	„
Leemahago at Glasgow	23 0	„
Ditto at Grangemouth	25 0	„
Arniston	22 0	„
Wemyss ...(at the pits)	16 0	„
Bridgeness	17 0	„
Kinneil		
Knightswood	18 0	„
Loebgelly	12 6	„
Lumphinan		
Methill	11 0	„

FIRE GOODS.

Best Bricks, 60s. per 1000, at Newcastle.
Do. Clay, 14s. per ton do.

LEAD.

Soft pig, £23 to £24 per ton.

WROUGHT IRON TUBING, subject to 25 per cent. Discount.

	2 inches.	1½ inch.	1¼ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
Ditto „ 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows, wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
Ditto, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain sockets	1 0	0 8	0 7	0 5	0 4	0 3
Flanches	1 9	1 6	1 3	1 0	0 9	
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 0	
Ditto 1 quart	11 6	10 6	10 3	10 0	9 6	

FREIGHTS, per Ton.

Coastwise—Newcastle.	9s. 0d
Chatham & Roches.	
Cork	12 6
Dover	9 9
Dublin	13 0
Exeter Quay	12 6
Folkestone	9 9
Hastings	13 0
Jersey	12 6
London	9 6
Lowestoft & Yarmth	6 6
Lynn	8 6
Margate	10 0
Portsmouth	11 0
Plymouth	11 6
Whitstable	10 0
Weymouth	10 6

Foreign.	
Boulogne	10s. 6d
Barcelona	33 0
Bordeaux	20. 0
Cadiz	14 3
Calais	10 6
Constantinople	48 0
Dieppe	12 9
Genoa	34 0
Hamburg	13 0
Havanna	13 0
Havre	12 6
Legnorn	35 0
Lisbon	15 0
Rotterdam	13 0
Stettin	10 0
Trieste and Venice	40 0